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Agricultural Research Institute

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U. S. DEPARTMENT OF AGRICULTURE
OFFICE OF EXPERIMENT STATIONS
A. C. TRUE, DIRECTOR

EXPERIMENT STATION RECORD

Volume XXV, 1911

WASHINGTON
GOVERNMENT PRINTING OFFICE
1912

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ILLUSTRATION.

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FIG. 1. Diagrammatic vertical section of potometer used in studying transpiration in corn 832

EXPERIMENT STATION RECORD.

VOL. XXV. JULY, 1911. No. 1.

In the elaboration of the organization of the agricultural colleges, which is now proceeding rapidly because of the great expansion of their work, the experiment station is generally regarded as the research division, as distinguished from the teaching and extension divisions. This fact is, however, obscured in the eyes of the public because of the great variety of publications which are being issued by the stations.

The miscellaneous character of these publications can not be said to have diminished as the stations have grown in experience and in the attempt to organize and differentiate their work. The number of publications has greatly increased, but in a majority of cases this increase is not made up of accounts of the station's activity as a research institution. It consists largely in the number of popular and informational bulletins and circulars, which relate to the extension department rather than to the experiment station proper. These are merged in the general station series in a manner which often gives a wrong impression.

There have been several successful efforts to start separate technical series which report the station's investigations in more scientific language and detail. This step is commendable in excluding the more technical accounts of station work from the general mailing list, and bringing such accounts to the notice of the persons for whom they are especially prepared. Such a classification is highly desirable if the miscellaneous character of the station publications is to continue, for not the least important phase of this subject is the influence the arrangement has on scientific readers.

The heterogeneous mixture of popular, semipopular, and technical articles, based in part on station work and in part on general sources of information, reports of inspection work and police regulations, announcements of college courses, nature-study publications for teachers and pupils, serves to obscure largely the bulletin of technical value. It makes it difficult for the station publications to secure the interest of and recognition from people interested in scientific and technical studies, because of the large mass of material under which it is buried, material which is useful in itself when distributed to the proper audience, but which serves to convey a wrong impression to the public mind and to the man of science as to the field and the work of the experiment station.

The annual report was formerly a place for technical papers of permanent value, as well as a general review of the station's activities for the year. This has come now to be very largely a purely administrative and fiscal report, brief and very general, often without even an enumeration of the projects or lines of work conducted during the year. As such it has ceased to have much interest or value as a record of progress. The coming of the Adams fund and the large amount of investigation which has grown out of it, has not as yet had a very noticeable influence on these reports or on the station publications as a whole. The Adams Act is supplying results of scientific interest and of practical application, and in a way it is furnishing a higher conception of experiment station work as a whole, but its influence on the publications has thus far been restricted and has been largely overshadowed by the demand for the more popular class.

The actual condition with reference to the character of the publications sent out by the experiment stations is shown by an examination of the records for the six months ended with April 1 of this year. It is found that out of 276 publications issued during that period 104 are records of the experimental work of the stations. In other words, only two-fifths of the total number of publications are of that description. Seventeen of these record scientific investigations such as would be appropriate under the Adams Act; 87 contain accounts of field experiments, miscellaneous studies in entomology, plant pathology, and veterinary medicine, and minor laboratory work in different departments.

Ninety publications, or about one-third of the total number, are miscellaneous popular publications covering a wide variety of subjects. Eleven of these are résumés of more technical publications recording experimental work, and some others contain more or less definite references to such work, but most of them are properly described as compilations of information from various, and usually indeterminate, sources. More than half of them are brief circulars, the relation of which to experimental work is quite remote.

The remaining publications, nearly one-third of the whole number, are of a formal and routine character. Forty-four are called forth by the inspection service, and there seems to be a tendency to multiply publications of this kind by dividing the reports of inspection work into small sections. This is probably largely due to the growing variety of inspection work, the results of which are of interest to different classes of readers, and the desire to get the reports of the service out promptly. Eight bulletins recording routine meteorological observations are in this list. There are also thirty annual reports, which with few exceptions are wholly of an administrative character.

Without knowing in detail the method of distribution of the station publications, it is impracticable to judge accurately of the effect of the issuance of so many kinds of publications. It is, however, probable that the widest circulation is given to the more popular publications. Since these for the most part do not definitely record experimental work, it would naturally follow that the general impression to be created would be that the stations are agencies for the general diffusion of agricultural information. There is much reason for believing that the public generally now consider the stations in this light.

This impression must be deepened by the miscellaneous character of the subjects treated in the compiled publications. A few examples of the titles of these publications will illustrate this point: Opportunities for profitable farming, Orchard practice, Poultry raising, Farm butter-making, Seed testing, The scheme of distribution of seeds and plants, A competitive corn test, Iron cow stall, Selecting and judging corn, Distribution of licensed stallions (in a certain region), Headache remedies, Lighting of farm homes, Tree growing at public schools, Experiments with plants and soils in laboratory, garden, and field (50 school exercises).

In the last case the term "experiments" is used in that loose and unfortunate meaning, as applied to the demonstrations or trials of well-known facts and principles by school children. The bad effects of such terminology is widely seen even in our higher institutions of learning and among experiment station men. It seems difficult under such conditions to establish correct standards for real experimental work.

The franking privilege possessed by the experiment stations, and thus far denied to the other divisions of the agricultural colleges, undoubtedly accounts for the inclusion of some publications in the station list. The performance of extension work by some stations under State laws has naturally led to their issuing extension publications.

One serious feature of this habit of issuing compilations which our stations have acquired is the great amount of time and energy thus diverted from experimental work. In this way not only is the amount of experimental work greatly diminished but the enthusiasm of the worker for experimental effort is often impaired. When once the easy path to public favor through the compiled bulletin has been trod it seems difficult for many men to pin themselves down again to painstaking and serious investigation of new problems.

The Office of Experiment Stations has ruled out the purely information bulletin as far as the use of the Federal funds is concerned—not that there may be no popular accounts of the station work and results, but rather that the popular bulletins of the stations shall be confined to such accounts, and the compiled bulletin or circular which makes no reference to the station issuing it and bears no relation to its work shall be segregated as far as expense is concerned from the legitimate field of the station. It has urged, furthermore, that in these popular accounts of the station work the station should be credited with having furnished the basis for the discussion, by definite reference to its experiments, in order that the account may not appear to be drawn from general sources of information.

Some little difficulty has been experienced in securing the recognition of these general principles, which should leave the station man free for his investigations and experiments in proportion to his salary from station funds, and should present in popular as well as technical accounts of experimental work the evidence on which the discussion rests, crediting the station with its contribution to the subject. In practice the station men continue to be called on for miscellaneous bulletins bearing no particular relation to their work, the preparation of which is usually a hardship and is an unfortunate interruption. Why should a station horticulturist, for example, who is charged with a large and exacting piece of research which is supposed to require most of his time, be expected to issue a comprehensive bulletin on the apple industry of his State, a résumé of general information on the methods of culture and care of an apple orchard, and similar matters; or a dairyman who is at the head of an experimental department devote his time to describing butter making on the farm as his only outgiving of the year? The limited time which such men have for experimental work which will add new facts or applications and be of permanent value is far too precious.

If our stations generally are ever to become strong experimental and research agencies and put their work on a truly scientific basis, they must be willing to limit the field of their activity in both work and publication. When we look away from the station publications to see what is actually going on at the stations, we are encouraged to find an increasing body of men devoting themselves as far as they are permitted to definite experimental work, a considerable portion of which is of a relatively high scientific character.

It will be a happy day for the American stations when the extension departments now being organized in the agricultural colleges take over fully the bureau of information work and publications and leave the station workers free to pursue their more legitimate functions.

Among the results attending the third session of the general assembly of the International Institute of Agriculture, which was held in Rome May 14–20, has been the bringing to the attention of the public the substantial progress which is being achieved in the development of this enterprise. Much of the interval which has elapsed since the initial conference in 1905 has of necessity been occupied in obtaining the cooperation and support of the forty-eight nations which have signed the convention establishing it, and in solving the relatively complex problems incident to the organization of so novel and extensive an undertaking. With the passing of the pioneer stage, however, the work of the Institute has been assuming more tangible form, and the last two years in particular have been noteworthy for the inauguration of several promising lines of work, among these the establishment of a number of serial publications of interest to scientific workers in agriculture.

It will be recalled by those familiar with the plan of organization of the Institute[a] that the general assembly is its governing body. Its duties are to vote the budget of the Institute, to review and approve the work of the "permanent committee," which is the executive body, and to authorize any changes contemplated in the plan and methods of work.

The assembly is a delegate body to which special representatives are sent by the adhering countries. In the decision of questions the various nations are on an equal footing, each having a single vote. A nation may, however, send as many delegates as it desires, and in most instances several representatives are appointed. In consequence the meetings are the occasion of bringing together a considerable body of men interested in agriculture from all over the world, and the social features which attend the gatherings serve to emphasize in a striking way the international aspect of this union of the world's forces in the promotion of the greatest of international industries.

As is well known, credit for the conception of the general plan of the Institute belongs to an American, Mr. David Lubin, of California, who has remained the representative of this country on the permanent committee throughout. The delegates to the recent general assembly included Hon. David J. Foster, recent chairman of the Committee on Foreign Affairs of the House of Representatives; Hon. Charles F. Scott, formerly chairman of the House Committee on Agriculture; Director E. Dana Durand, of the Bureau of the

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[a] For a detailed account of the formation and plan of organization of the Institute, see a previous note (E. S. R., 19, pp. 500–503).

Census; Mr. Victor H. Olmsted, Chief of the Bureau of Statistics of this Department; and Mr. Edgar R. Champlin, of Boston.

Aside from the administrative reports upon organization, finances, and the routine work of the various bureaus, a number of special questions of international importance were presented to the assembly for discussion. The results of an inquiry as to measures in operation in the various adhering countries for the protection of birds were summarized by the permanent delegate of Hungary, E. de Miklós. The feasibility of an international meteorological service was discussed by the French delegate, Louis Dop. Prof. G. Cuboni, delegate of Ethiopia, described measures to be taken to establish an effective cooperation between nations in the combating of plant diseases, and suggestions were made as to the measures desirable to check the spread of dodder. The utility of an international agreement as to insurance against hail was discussed by the Norwegian delegate, G. Fjelstad, and the Austrian delegate, V. de Pozzi.

The subject of agricultural statistics was, as usual, a leading topic of discussion, as this is one of the principal duties specifically intrusted to the Institute. Dr. T. Müller, delegate of Germany, reported on those for crop production; the Russian delegate, G. Zabiello, on prices and similar commercial aspects; the Belgian delegate, O. Bolle, on the organization of an international service of foreign correspondence; and the Austrian delegate on statistics of agricultural and cooperative societies. A phase of statistical work which received particular consideration was the method of expression of statistical reports as to crop conditions. It has been learned that the method in vogue in the Bureau of Statistics of this Department in which the conditions are expressed in percentages was adopted as the official method of the Institute.

The compilation of agricultural statistics has from the start received particular attention from the Institute. Among its earliest publications were volumes entitled *L'organisation des Services de Statistique Agricole dans les Divers Pays*, *L'organisation des Services de Statistique en Suède*, and *Statistique des superfices Cultivées, de la Production Végétale, et du Bétail dans les Pays Adhérents.* Since January, 1910, there has also been published a monthly *Bulletin of Agricultural Statistics*, issued in English, French, German, Spanish, and Italian editions, and briefly summarizing the prevailing crop conditions throughout the world.

Another duty formally assigned to the Institute is to "study questions concerning agricultural cooperation, insurance, and credit in all their forms, collect and publish information which might be useful in the various countries in the organization of agricultural cooperative insurance and credit institutions, [and] state the wages of farm laborers." The carrying out of this work has been delegated to a bureau under the direction of Prof. Giovanni Lorenzoni, and beginning with September 30, 1910, a monthly *Bulletin of the Bureau of Economic and Social Intelligence* has been issued dealing with these subjects. The initial numbers have dealt especially with the present status of agricultural cooperation and the wages of farm laborers, this presentation being preliminary to more detailed studies. The publication is printed in French, and for the present in English editions as well, and each number contains about 400 pages of material, arranged on a geographical basis and summarizing available data, as well as monographs on certain phases of the subject, news notes as to the progress of agricultural cooperation, and other items of related interest. It is announced that subsequently it is hoped through direct collaboration with the various countries to arrange for the publication of original material as well.

A third serial publication is the *Bulletin Bibliographique Hebdomadaire*, which is now in its second volume. This consists of two portions, the first a classified list of the accessions received by the library of the Institute during the week under review, thus corresponding in a general way to the Monthly Bulletin of the Library issued by this Department, and the second a similarly classified list of articles of general agricultural interest which have appeared in the serial publications received. Brief notes as to the scope of these articles accompany the reference to them in some cases.

The remaining serial publication of the Institute, *Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases*, has the announced purpose to "review without delay the scientific and technical, and in part the legislative, literature of agriculture and the allied industries," and to furnish "a periodical summary of the agricultural literature of the world." It is published monthly, each number reviewing material received for the month preceding, and thus far each number has contained about 200 pages. At present both English and French editions are issued.

The supervision of this publication is intrusted to two directors, Prof. Italo Giglioli and Dr. Jules M. Saulnier. They are assisted by a corps of 11 abstractors and several translators.

Inasmuch as the statistical and economic phases of agriculture are provided for in the Institute publications already described, it is the announced intention to restrict this *Bulletin* to "the domain of the physical, chemical, biological, and technical conditions which govern farm and forest." In the numbers which have thus far appeared, however, while the more scientific phases have been by no means disregarded, there is still an evident preference in the selection of material for review for articles of a popular nature and of immediate practical interest, and a tendency to give considerable space to the economic significance of the data presented. In this respect the point of view of the *Bulletin* differs from that of *Experiment Station Record*, in which the aim has been rather to present the new scientific truths which have been discovered, with reference to their bearing on the fundamental principles of the agricultural industry. Whereas the *Record* is designed for the use of the agricultural investigator and teacher rather than directly by the farmer, the treatment in the *Bulletin* is such as to afford assistance to both classes of readers.

With the large and constantly increasing body of agricultural workers, scattered through so many lands and presenting their results in so many tongues and so diverse mediums, the establishment of agencies for the assembling, preservation, and dissemination of the results of the vast fund of agricultural knowledge which is accumulating becomes of increasing importance with every year. The oblivion in which the work of Mendel was buried for many years may be cited as a well-known instance of what has doubtless not infrequently befallen important researches reported in obscure publications and remaining unknown to the average investigator. By reason of its international organization and other facilities at its disposal the International Institute of Agriculture would seem to have before it unusual opportunities to act as a clearing house of agricultural statistics and literature. Its activities along these lines will be most heartily welcomed by the workers in agricultural science of the world, to whom, if it is accorded the support necessary, it should be able to render valuable service.

To meet the recent increase in volume of the literature reviewed in *Experiment Station Record*, arrangements have been made for an additional abstract number in each volume, beginning with the current one. In this way each volume will hereafter contain nine numbers and an index. It is hoped that the extension may make it possible to keep the published reviews quite closely up to date.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The biological reactions of the vegetable proteins, H. G. Wells and T. B. Osborne (*Jour. Infec. Diseases, 8 (1911), No. 1, pp. 66–124*).—These experiments were performed with the globulin obtained from the castor bean, flax seed, and squash seed, with edestin from the hemp seed, excelsin from the Brazil nut, proteins from the coconut, legumin from the vetch, legumin and vicilin from the pea, vignin from the cowpea, glycinin from the soy bean, gliadin from wheat and rye flour, hordein from barley, and zein from maize. All of these were found to produce typical anaphylaxis in sensitized animals, the condition possessing all of the characteristics which are present when anaphylaxis is produced with serum or other animal substances containing soluble proteins.

It was found that considerable differences in toxicity were produced by the various proteins. "The most toxic proteins, as measured by the frequency of severe and fatal reactions, were the globulin of the squash seed, vignin, excelsin, and castor-bean globulin, which usually caused death when given in 0.1 gm. doses to properly sensitized animals. Edestin caused the least severe reactions of any of the proteins, while hordein and glycinin seldom caused fatal reactions; nevertheless, the minimum sensitizing and intoxicating doses of edestin and squash-seed globulin are essentially the same."

The experiments showed, furthermore, that where continuous feeding was done with the proteins, the guinea pigs became immune to the proteins and could not be sensitized to them. There was a marked specificity shown within certain limits by the proteins, and a close similarity, if not identity, of the legumins of the pea and vetch and the close relation to the vicilin of the pea was shown by the interaction of these proteins. The probable identity of the gliadins from wheat and rye, or at least their near relation, was also established. "In some instances doubtful results were obtained, for example with some guinea pigs castor-bean globulin and flax-seed globulin interacted strongly, while with others similarly treated no reactions were obtained."

The aporrhegmas, D. Ackermann and F. Kutscher (*Ztschr. Physiol. Chem., 69 (1910), No. 3–4, pp. 265–272; abs. in Chem. Abs., 5 (1911), No. 6, p. 1112*).—The authors propose the name "aporrhegma" to designate all the fragments of amino acids which arise during the physiological cycle of plants or animals. They believe that the cleavage of amino acids in the tissues of higher plants and animals goes on in the same manner, and has the same intermediary products as are involved in the biochemical processes of the putrefactive organisms. The paper also discusses methylated aporrhegmas, the significance of methylation, the origin and distribution of betains in plants, etc.

Apparatus for collecting and measuring the gases evolved during fermentation, A. Harden, J. Thompson, and W. J. Young (*Bio-Chem. Jour., 5 (1910), No. 5, pp. 230–235, figs. 2*).—The apparatus is described and illustrated.

The precipitation of the sulphate ion as barium sulphate, E. Ruppin (*Chem. Ztg., 34 (1910), No. 135, p. 1201*).—The author proposes the following method which is claimed to have definite advantages in regard to accuracy and time but can not be used for solutions containing heavy metals:

The dilute, slightly acid (HCl[1]) solution containing the sulphate ion is brought to active boiling, and to it is added an excess of barium chlorid (200 gm. of water-free salt in 1 liter), corresponding to 50 per cent of the sulphate present. The mixture is allowed to stand until the next day, the supernatant fluid poured off through a filter, and the filtrate thrown away. The residue is then boiled for ½ hour with 125 cc. water which has been slightly acidified with nitric acid, and allowed to settle. The supernatant fluid is passed through the original filter and the residue repeatedly subjected to the same treatment until the precipitate is free of chlorin.

The wash waters in each instance are reserved, and after the completion of the process the filter is punctured and the portion of the precipitate on the filter is washed into the beaker containing them. The wash waters are then concentrated to a bulk of 200 cc., and to them is added 2 cc. of a saturated barium nitrate solution, cooled, and the resulting precipitate allowed to settle ½ hour. After this the precipitate is brought on the filter and washed, the major precipitate is added, and the whole dried at 100° C. The precipitate is then separated from the filter and both filters employed in the process are incinerated in a porcelain crucible. The ash is added to the precipitate, heated with a small flame, cooled, and weighed.

A volumetric method of determining iodid in the presence of chlorid, bromid, or free iodin, W. C. BRAY and G. M. J. MACKAY (*Jour. Amer. Chem. Soc., 32 (1910), No. 10, pp. 1193–1204*).—"In this article a method of determining iodid in aqueous solution is described, which depends upon the oxidation of the iodid . . . by permanganate, the removal of the liberated iodin by carbon tetrachlorid, and the titration of this iodin with a standard sodium thiosulphate solution."

A note in regard to the Kjeldahl method for determining nitrogen, E. F. HARRISON and P. A. W. SELF (*Pharm. Jour. [London], 4. ser., 31 (1910), No. 2437, p. 4; abs. in Chem. Ztg., 34 (1910), No. 100, Repert., p. 409*).—The authors draw attention to the fact that when distilling off the digested fluid a portion of the alkaline fluid is carried over with the vapors into the distillate, thus bringing an error in the final results.

A new method for estimating phosphoric acid, G. F. W. MARTIN (*Abs. in Ztschr. Angew. Chem., 24 (1911), No. 4, p. 173*).—The phosphoric acid is precipitated as ammonium phosphomolybdate. After washing with distilled water the precipitate is dissolved in an excess of potassium hydrate and the ammonia contained in the mixture distilled over into a measured amount of normal acid (102 parts of ammonia=142 parts of phosphoric acid).

Titrametric determination of citrate-soluble phosphoric acid, L. WUYTS (*Ann. Pharm., 1910, p. 337; abs. in Ann. Falsif., 4 (1911), No. 27, p. 46*).—The method is as follows:

To 10 cc. of a 2 per cent citrate-phosphate solution add a few drops of hydrochloric acid, evaporate in a small porcelain dish, add 3 or 4 drops of nitric acid and a few cubic centimeters of water. Then add 10 cc. of strong nitric acid (specific gravity 1.4), 15 cc. of ammonia, boil for from 2 to 3 minutes, cool, add 25 cc. of ammonium molybdate, and stir with a glass rod. Decant on the filter with cold water; 5 to 6 washings are usually sufficient. Dissolve the precipitate in potassium hydrate solution, controlling this with phenolphthalein, add 50 cc. of water, and titrate back with a normal solution of sulphuric acid. The number of cubic centimeters of potassium hydrate solution utilized directly represents the percentage of phosphoric acid present.

Citrate-solubility of phosphoric oxid in basic slag, E. V. FLACK (*Chem. News, 102 (1910), No. 2657, pp. 221, 222, abs. in Analyst, 36 (1911), No. 418, p. 32*).—The author shows that, as is well recognized, there is a wide difference between the proportion of phosphoric acid dissolved from basic slag by Petermann's neutral ammonium citrate solution and the proportion dissolved by 2 per cent citric acid solution.

"The author points out that, in analyzing the citric acid solution of the slag, if the phosphoric acid be determined by 'direct' precipitation with magnesia mixture in presence of ammonium citrate, reliable results can not be obtained unless the silica is first removed by evaporation of the solution to dryness with strong hydrochloric acid. Unless this precaution is observed, the percentage of soluble phosphoric acid indicated is, in his experience, on the average about 0.5 per cent too high."

Estimating the phosphoric acid in soils and crops, H. KASERER and I. K. GREISENEGGER (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 10, pp. 795–802; abs. in Chem. Zentbl., 1910, II, No. 21, p. 1631*).—The authors utilized Neumann's method (E. S. R., 12, p. 21; 20, p. 111), with certain modifications, for estimating the phosphoric acid in plants and soils, as follows:

From 2 to 3 gm. of the comparatively dry substance is burned with sulphuric acid, 1 drop of mercury, and 1 gm. of potassium sulphate. When the process is completed the mixture is transferred to a 165 cc. flask, filled to the mark with water, allowed to stand over night to let the silicic oxid settle, and then filtered. To 150 cc. of the filtrate 50 cc. of ammonium nitrate (500 gm. ammonium nitrate in a liter of solution) is added, the solution heated to from 80 to 90° C., 40 cc. of 10 per cent ammonium molybdate solution (100 gm. of ammonium molybdate in 1 liter) added, and the mixture allowed to cool. The solution is filtered through a Gooch crucible containing an asbestos filter (at least 15 minutes and not over 3 hours after precipitation and cooling), washed with water and alcohol, and the precipitate washed back into the beaker glass and dissolved with one-fourth-normal sodium hydrate, using phenolphthalein as the indicator. The solution is then boiled for 15 minutes and the excess of alkali titrated back with acid. One cc. of one-fourth-normal sodium hydrate solution=0.634 gm. of P_2O_5.

Soils (50-gm. samples) are decomposed with 100 cc. of nitric acid (1:1), made up to 500 cc. with water, and 100 cc. of the filtrate treated with sulphuric acid but without potassium sulphate, except that soils poor in calcium require the potassium sulphate.

Determining phosphoric acid by Neumann's method, J. M. KRASSER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 3, pp. 198–200*).—According to the author good results can be obtained in estimating the phosphoric acid in canned soups and similar goods with the Neumann method (E. S. R., 12, p. 21; 20, p. 111) when the necessary precautions are taken. See also previous notes (E. S. R., 20, p. 610, and above).

Some methods of analyses for soil investigations, A. VESTERBERG (*Verhandl. Internat. Agrogeol. Konf. [Stockholm], 2 (1910), pp. 125–141, fig. 1*).—A method for the titrametric estimation of carbon dioxid, carbonates, etc., in soils, which was previously noted (E. S. R., 23, p. 10) is again described, and the author points out the advantages to be derived from its use. In addition, he discusses and describes a simplified Pouget and Chouchak method (E. S. R., 20, p. 111) for the estimation of peat and humus in clay soils, and one for titrating humic acid solutions, and a rapid field method for approximately determining the calcium in the soil which depends upon the interaction of calcium carbonate and ferric chlorid, the residual ferric chlorid being determined with potassium sulphocyanate. The author also points out the necessity of setting up a uniform procedure for determining the reaction of the soil, and calls attention to some inaccuracies in the method in which phenolphthalein is used. The value of estimating the amount of water-soluble salts in soils by the electrical conductivity method (E. S. R., 24, p. 210) is discussed and accompanied by the results of tests with Swedish soils.

The methods of soil analysis employed at the Passoeroean Sugar Experiment Station [Java] (*Jaarver. Proefstat. Java Suikerindus., 1909, p. 89*).—A description of the methods and reagents required.

A biochemical reaction for detecting pollution in water supplies, A. W. Sellards and **E. Bartow** (*Amer. Jour. Pub. Hyg., 20 (1910), No. 3, pp. 682-688*).—A bacteriological-chemical method is described, with which it is possible to tell the source of the ammonia in water and also the significance of the free ammonia estimation in sanitary water analysis.

Some considerations on colorimetry, and a new colorimeter, N. Roberts (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 66, pp. 79-93, figs. 5*).—A description of a simple colorimeter for use in the sanitary anaylsis of water. Methods for using the apparatus in general colorimetry are also described.

Method for the analysis of fat, David (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 81, pp. 756, 757*).—The method depends on the fact that the ammoniacal salts of the solid fatty acids are completely insoluble in an excess of ammonia. These are collected and decomposed on the filter with hydrochloric acid and weighed directly as fatty acid.

In regard to the Kumagawa-Suto method for fat, Y. Shimidzu (*Biochem. Ztschr., 28 (1910), No. 3-4, pp. 237-273*).—The method,[a] according to the author, gives reliable results when fresh tissues and organs are employed, but low results are obtained if large quantities of the fresh tissues are dried on the water-bath prior to extracting the fat. Aiding the drying process with alcohol did not seem to remedy this. The loss in some cases where drying was resorted to with alcohol was as high as 10 per cent, while with small quantities of material when drying was assisted with alcohol the loss was under 1 per cent. The loss of fat is attributed to the oxidization of the fatty acids, and when tissues are to be dried this should be done in a dry vacuum without heat. The method did not give good results with blood.

Determination of fat in foods, E. Polenske (*Arb. K. Gsndhtsamt., 33 (1910), No. 3, pp. 563-579*).—After discussing the comparative value of the usual hot extraction method and the shaking out method for estimating fat in foods, the author describes a new shaking out method for determining fat in plant substances. In this method the material is first treated with hydrochloric acid in a boiling water bath, and after cooling the fat is extracted by shaking with ether and petroleum ether. The results with the method and various cereals, legumes, meat, and dairy products are given.

About banana flour and its microscopic examination, T. F. Hanausek (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 4, pp. 215-220, figs. 2*).—A general discussion in regard to the uses of banana flour and its histology.

Determination of solids in vinegar, R. T. Mohan (*Pure Products, 7 (1911), No. 1, pp. 22, 23, fig. 1*).—The author points out that the official method for estimating the total solids in vinegar by evaporation is faulty, because some of the volatile acid is not driven off. In its stead he recommends using sensitive standardized hydrometers for determining the specific gravity of the vinegar, and presents a correction table for use with such instruments.

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[a] Biochem. Ztschr., 8 (1908), p. 212.

Estimation of phosphoric acid in ciders and vinegars, F. F. HASBROUCK (*Pure Products, 6 (1910), No. 10, pp. 583–585*).—The author describes a composite volumetric method, in which either acid and alkali or ammonia and potassium permanganate are employed as the titrating agents.

Honey fermentation and some notes in regard to the chemical composition of honey, T. NUSSBAUMER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 5, pp. 272–277*).—The author found several species of zygosaccharomycetes in numerous samples of honeys and from different sources, the origin of which could not be determined. Natural honeys did not generally give the Fiehe reaction. Foreign honeys gave a lesser protein precipitate (Lund) than European honeys.

Identification test for caramel, G. H. P. LICHTHARDT (*Jour. Indus. and Engin. Chem., 2 (1910), No. 9, p. 389*).—The following reagent for detecting caramel in vinegars, liquor, and flavoring extracts has given good results in the hands of the author: Tannic acid 1 gm., sulphuric acid (specific gravity 1.84) 0.75 gm., and enough water to make 50 gm.

Saffron and its adulteration, E. COLLIN (*Ann. Falsif., 3 (1910), No. 23, pp. 353–369, figs. 14*).—This article describes the usual microscopical appearance of saffron and discusses the normal and abnormal impurities in the commercial article.

Distilled liquors: Whisky (rye, Bourbon, and Scotch), brandy (cognac), and gin, W. C. HOLMES (*Philippine Jour. Sci., A. Chem. and Geol. Sci., 5 (1910), No. 1, pp. 23–28*).—A study of methods, with some recommendations, and analyses of distilled liquors which entered the port of Manila.

The bitter acid content of Hungarian hops, G. BIBÓ (*Kisérlet Közlem., 13 (1910), No. 4, pp. 419–427*).—The author examined 33 samples of Hungarian hops and found the average bitter acid content to be 3.38 per cent, the maximum 4.89 per cent, and the minimum 1.76 per cent.

The sources of error in the Folin method for the estimation of creatinin, A. E. TAYLOR (*Jour. Biol. Chem., 9 (1911), No. 1, pp. 19, 20*).—Among the sources of error in this method (E. S. R., 17, p. 165) pointed out by this author are the range of concentration (5 to 15 mg. in the volume to be tested), the varying intensity and quantity of normal and abnormal urinary pigments, dilution in its relation to the amount of picric acid employed, the eye in the absence of standardized light, and the kind of light used. "Under ideal conditions, the method will enable one to estimate 10 mg. of creatinin with an accuracy of plus or minus 0.1 mg."

A modified guaiac test with sodium peroxid, B. BARDACH and S. SILBERSTEIN (*Ztschr. Physiol. Chem., 65 (1910), No. 5–6, pp. 511, 512; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 9–10, p. 462*).—The test is carried out as follows:

To 5 cc. of the fluid to be examined add a freshly prepared alcoholic solution of guaiac dropwise until the fluid begins to become opaque, and then a knife point of sodium peroxid, following quickly with 2 cc. of a 30 per cent acetic acid solution, and covering the mixture with a layer of alcohol. Even when small traces of the blood or other reacting substance are present a blue ring is obtained.

The chemical processes involved in the coagulation of milk by rennet, I. BANG (*Skand. Arch. Physiol., 25 (1911), No. 1–3, pp. 105–144*).—The results of these extensive experiments show that the processes involved in the coagulation of milk are exceedingly complex.

In the case of the calcium salts it could be noted that these are distributed among the organic and inorganic acids, lactalbumin, lactglobulin, and casein.

Casein, on the other hand, reacts with certain bases as an acid. It was further noted that long before the actual coagulation takes place paracaseins are successively produced, with always a greater and greater affinity for calcium phosphate. As a result of this the paracasein takes up more and more calcium phosphate, until finally so much is in combination with it that coagulation takes place.

Coagulation, according to the author, is many phased. There are first numerous phases of paracasein formation, and in the others the combination of paracasein and the calcium phosphate takes place, this probably requiring the longest time for its execution. The author does not believe that rennet should be classed among the coagulating enzyms, as the coagulation of the paracasein is in reality brought about by the calcium salts and therefore can not be considered a true coagulation.

Contribution to our knowledge of milk catalase, F. SPINDLER (*Biochem. Ztschr., 30 (1911), No. 5, pp. 384–412, fig. 1*).—This work, which was conducted with Lobeck's apparatus (E. S. R., 23, p. 13), brought out the fact that the highest catalytic power was present in goats', cows', and pigs' colostrum and which is smaller if the sample is taken after milking or feeding the young.

An abnormal catalase figure (as compared with normal milk) is usually present for 8 days after birth, but if present after that time it is due to an inflammation of the mammary gland. Mastitis milks have a large catalytic power throughout the whole cycle of the disease, and sometimes retain it for considerable time after the disease is no longer apparent. Udder diseases, such as abscess and necrotic areas in the glands, cow pox, and udder furunculosis also yield a milk with a high catalytic figure. In other diseases, such as peritonitis and tuberculosis (without udder involvement), a large figure may be present during certain stages of the disease.

Fresh milk rich in catalase is usually alkaline, and in many instances an undiseased gland will yield more than the standard amount of oxygen (2.5 cc. from 15 cc. of milk). Milks which have an addition of sodium bicarbonate, and those obtained from practically dry and sterile animals, also have a high catalase content. The author points out the value which the test may have for identifying diseased quarters, but states that the limit of 2.5 cc. is much too low. It was found that goat's milk at times yields very low figures and at other times abnormally large figures for catalase. Yogurt and kefir yield high catalase figures, but these are proportionate to the age of the milk product.

Estimation of catalase in milk, VON HEYGENDORFF and MEURER (*Milchw. Zentbl., 6 (1910), No. 12, pp. 529–533*).—The authors determined the oxidizing capacity (catalytic activity) of various milks with Lobeck's apparatus (E. S. R., 23, p. 13) and under varying conditions. In conjunction with this, the bacterial content of milk was also noted. The results show that the oxidizing capacity rises with an increase in bacterial content, and that where a high catalytic power is present a large bacterial content is to be expected.

Detection and determination of nitrates in milk by the diphenylaminsulphuric acid reaction, J. TILLMANS (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 11, pp. 676–707; Molk. Ztg. Berlin, 21 (1911), Nos. 2, pp. 16, 17; 3, pp. 26–28*).—The reaction has been very thoroughly examined by the author, who finds that the presence of small amounts of chlorids seems to be essential to the development of the coloration obtained with the diphenylaminsulphuric acid reagent with small and relatively large amounts of nitrates. The reaction is also of value for nitrites, the only difference being that with nitrites the reaction appears quicker, and that chlorids are not necessary. Proteins, particularly peptones, and milk fat prevent the formation of the blue color, but the milk can be freed from all objectionable bodies by treating it with calcium hydrate and shaking the fat out with ether before making the test. Milk serum which contains as little as 0.25 mg. of nitric acid (N_2O_5) per liter gives a distant blue coloration.

The test can be used quantitatively and allows the detection of as little as 5 per cent of added water to milk where the water contains not less than 10 mg. of nitric acid (N_2O_5) per liter. Milk which contains much dirt will yield a slight coloration with the reagent, but the presence of a little of such matter does not affect the test.

The qualitative test is conducted as follows: Two cc. of the reagent (0.085 gm. diphenylamin and 190 cc. dilute sulphuric acid 1 : 3, shaken carefully until the diphenylamin dissolves, made up to nearly 500 cc. with concentrated sulphuric acid, cooled, and filled to the mark with the same acid) is placed in a test tube with 0.5 cc. of the water or milk serum (whichever is to be tested), and the mixture shaken and cooled. A distinct maximum blue coloration is obtained in about 1 hour if nitrates are present.

A method for the estimation of citric acid in milk, E. DESMOULIÈRE (*Bul. Sci. Pharmacol., 17 (1910), No. 10, pp. 588–594*).—The method is as follows:

To 200 cc. of milk add 100 cc. of a 2 per cent acetic acid solution, bring the mixture to the boiling point, cool, filter off 150 cc. of clear filtrate, and evaporate on the water bath. The addition of from 2 to 3 gm. of sea sand and frequent agitation of the mass facilitates the drying process. After drying, cool the dish and its contents, add 3 cc. of dilute sulphuric acid (0.2 gm. per cubic centimeter), and allow to stand for 3 hours, stirring from time to time. After this period add another 3 gm. of sand to the mass and extract the citric acid with ether saturated with water. Allow the ethereal layer to separate, draw it off, evaporate the ether, and take up the residue with water.

The aqueous solution thus obtained contains citric acid, acetic acid, and a little phosphoric acid. The phosphoric acid and acetic acid are then determined and subtracted from the total acidity, the remainder of which will represent the citric acid.

A method for the estimation of reducing sugars, S. R. BENEDICT (*Jour. Biol. Chem., 9 (1911), No. 1, pp. 57–59*).—This is a modification of a method previously described (E. S. R., 19, p. 8) and another noted somewhat later,[a] which employs sodium citrate in addition to the other reagents.

The solution has the following composition: "Copper sulphate (crystallized) 18 gm., sodium carbonate (crystallized) 200 gm., sodium citrate 200 gm., potassium sulphocyanate 125 gm., 5 per cent potassium ferrocyanid solution 5 cc., distilled water to provide a total volume of 1,000 cc. With the aid of heat dissolve the citrate, carbonate, and sulphocyanate in enough water to make about 800 cc. of the mixture, and filter. Dissolve the copper sulphate separately in about 100 cc. of water and pour the solution slowly into the other liquid, with constant stirring. Add the ferrocyanid solution, cool, and dilute to exactly 1 liter. Of the various constituents, only the copper salt need be weighed with exactness. Twenty-five cc. of the reagent are reduced by 0.050 gm. of glucose, or by 0.053 gm. of levulose."

The directions for conducting the tests are as follows: "Measure 25 cc. of the reagent into a porcelain evaporation dish (25 to 30 cm. in diameter) and add 10 to 20 gm. of crystallized sodium carbonate (or one-half the weight of the anhydrous salt) and a very small quantity of powdered pumice stone. Heat the mixture to vigorous boiling over a free flame and run in the sugar solution quite rapidly until a heavy white precipitate is produced and the blue color of the solution begins to diminish perceptibly. From this point the sugar solution is run in more and more slowly, with constant vigorous boiling, until the disappearance of the last trace of blue color, which marks the end-point. . . . In applying this process to urine, the latter should be diluted 1:10, unless the sugar content is known to be very slight."

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[a] Jour. Biol. Chem., 5 (1909), p. 485.

Invert sugar and its importance for seed beet polarization, W. Stephani (*Bl. Zuckerrübenbau, 17 (1910), Nos. 13, pp. 213–217; 14, pp. 234–238*).—The author points out the importance of determining the sugars (by polarization) of seed feed beets and gives the procedure for this.

Methods for examining the raw materials, products, and by-products of the sugar industry, R. Frühling (*Anleitung zur Untersuchung der für die Zuckerindustrie in Betracht kommenden Rohmaterialien, Produkte, Nebenprodukte, und Hilfssubstanzen. Brunswick, 1911, 7 ed., rev. and enl., pp. XVIII+535, figs. 140*).—This is the seventh revised and enlarged edition of this work. Among the topics with which it deals are sugar and sugar-containing substances, bone charcoal, water, limestone, saturation gas, sodium carbonate and hydrate, hydrochloric acid, chimney and furnace gases, artificial fertilizers, sugar-beet seeds, and molasses feeds.

The determination of nicotin in nicotin solutions and tobacco extracts, R. M. Chapin (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 133, pp. 22*).—This bulletin describes an accurate and rapid method for the determination of nicotin, which is especially applicable to the examination of nicotin-containing sheep dips and scabicides.

The Kissling method adopted as official yields, according to the author, good results in experienced hands and in the absence of interfering substances, but its use by the unwary is liable to lead to considerable error. Toth's method[a] was found to check up well with the Kissling method, but requires considerable time for the preparation of the samples, and as in the Kissling method the presence of pyridin bases in the extract may yield erroneous results.

The author has utilized the general principles involved in the Bertrand and Javillier silicotungstic acid method,[b] in which the nicotin is precipitated from its hydrochloric acid solution with silicotungstic acid, the nicotin freed from this combination with calcined magnesia, and distilled in the usual manner and titrated. He has introduced, however, several modifications for rendering it more accurate and rapid, the chief one being the weighing of the incineration residue from the nicotin silicotungstate. This is termed the anhydrid method.

Comparative analytical results with the methods and commercial nicotin preparations are reported.

Commercial turpentines: Their quality and methods for their examination, F. P. Veitch and M. G. Donk (*U. S. Dept. Agr., Bur. Chem. Bul. 135, pp. 46, fig. 1*).—This bulletin, in addition to proposing and describing improved and simplified methods for the analyses and testing of turpentines, shows the extent to which turpentine is adulterated (most commonly with petroleum oil), indicates the losses undergone by turpentine farmers, and presents other data.

It was noted that turpentines which had not been adulterated, in the sense that nothing had been added to or removed from them, showed great variations upon analysis. This was particularly the case with old turpentines. Where adulteration was discovered in the turpentine belt it was mostly in goods in the hands of the primary buyers and dealers, the samples from the producers being only occasionally adulterated. The adulteration, however, was greatest outside the turpentine belt. Standard samples obtained from authentic sources were found to be far from uniform in regard to color.

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[a] Chem. Ztg., 25 (1901), No. 57, p. 610.

[b] Bul. Sci. Pharmacol., 16 (1909), No. 1, pp. 7–14.

The authors propose the following specifications for turpentines, which are applicable for gum spirits turpentine and wood turpentine: "Standard or No. 1 turpentine should have a specific gravity at 20°C. of from 0.862 to 0.870; a refractive index at 20°C. of from 1.468 to 1.476; 95 per cent should distill below 170°C., and a layer of not less than 200 mm. should be required to equal in color the Lovibond yellow glass No. 1. On polymerization with 38 normal sulphuric acid the residue should not exceed 1 per cent, should be reddish in color and viscous, and its refractive index at 20°C. should be from 1.500 to 1.520. An unadulterated turpentine which does not agree with these requirements may properly be regarded as not of standard or No. 1 quality."

Second quality or No. 2 turpentine should have the same specific gravity and refractive index requirements, and 90 per cent should distill below 170° C. and a depth of not less than 100 mm. should be required to equal the Lovibond yellow glass No. 1. The polymerization residue must not exceed 1 per cent and must have a refractive index of not less than 1.50.

Third quality or No. 3 turpentine should have a specific gravity at 20° C. of from 0.865 to 0.880; a refractive index at 20° C. of from 1.468 to 1.485; 60 per cent should distill below 170° C. and a depth of not less than 50 mm. should be required to equal the Lovibond yellow glass No. 1. The polymerization residue must not exceed 1 per cent and must have a refractive index of not less than 1.500.

Tabulated results of the examination of many samples obtained from producers, primary buyers, and dealers are given, from inside and outside of the turpentine belt.

METEOROLOGY—WATER.

The atmosphere: Its characteristics and dynamics, F. J. B. Cordeiro (*New York and London, 1910, pp. VIII+129, figs. 35*).—This book treats quite exhaustively of the characteristics and circulation of the atmosphere, attempting to correct and complete work on this subject from the point where Ferrel left it.

"Since the work is necessarily purely mathematical, all methods and demonstrations have been presented in the simplest manner possible, so that they may be understood by the greatest possible number of readers.

"The general circulation of the atmosphere, which is treated at some length, has been found to be essentially different from Ferrel's earlier as well as his later conceptions of it. The mechanics of certain nonmeteorological phenomena, such as sound, and those coming under the head of light, electricity, etc., have been explained in a simple manner."

Nitrates in the air of southern regions, A. Müntz and E. Lainé (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 4, pp. 166–169*).—This article reports the results of examination of samples of rain and snow collected in different parts of the southern hemisphere during the Charcot expedition to the Antarctic regions.

The amounts of nitrates found in these samples did not vary materially from those found in the snow and rain of temperate regions of Europe, the average for rain being 0.225 mg. per liter and in snow 0.233 mg. per liter. There was no opportunity to study possible correlation between the nitrate content of the air and the appearance of polar auroras.

The influence of the moon on plant growth, C. Flammarion (*Bul. Mens. Off. Renseig. Agr. [Paris], 9 (1910), No. 11, pp. 1264–1267*).—In a previous publication (E. S. R., 17, p. 532) the author reported experiments to determine the effect of the phase of the moon at the time of planting on a number of vegetables, and these experiments have continued for a considerable period.

In 28 cases the greatest yield corresponded to planting at the time of the new moon, 29 to planting in the first quarter, 28 at the time of the full moon, and 27 in the last quarter, there apparently being no material difference to be attributed to the influence of the moon.

Monthly Weather Review (*Mo. Weather Rev., 38 (1910), Nos. 11, pp. 1625–1774, figs. 3, charts 33; 12, pp. 1775–1927, figs. 3, charts 34*).—In addition to the usual climatological summaries, weather forecasts and warnings for November and December, 1910, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts, these numbers contain a paper entitled The Waterpower Resources of Georgia (illus.), by C. F. von Herrmann, and the following special papers:

No. 11.—The Drought of 1910 in Kansas, by S. D. Flora; Irrigation in Salt River Valley, Arizona, by L. N. Jesunofsky; Peaches and Climate, by W. T. Clarke; and A Peculiar Squall (illus.), by A. G. McAdie.

No. 12.—Are the Springs Colder Now? by G. Reeder; New Site for the Colorado River Dam, by L. N. Jesunofsky; Weather Bureau Records and Their Use, by W. W. McLaughlin; Seasonal Precipitation Measurements, by J. C. Alter; Experiments in Frost Protection (illus.), by A. G. McAdie (see p. 37); and Fog and Frost in the San Gabriel Valley (illus.), by A. G. McAdie.

Meteorological observations (*Michigan Sta. Rpt. 1910, pp. 187–200*).—Tabulated daily and monthly summaries are given of observations during 1909 at East Lansing, Mich., on temperature, pressure, precipitation, cloudiness, wind movement, etc.

Note on the amount of silt carried by the Nile during the floods of 1908 and 1910, F. HUGHES (*Cairo Sci. Jour., 5 (1911), No. 53, pp. 29–36*).—This article reports and discusses results of silt determinations in samples of flood waters of the Nile collected near Cairo and from other parts of the river and in some of the irrigation canals, the object being to ascertain the variation in the amount of suspended matter at different depths in the water and at different points in the course of its flow, and thus to show what part of the suspended matter reaches the land under the present conditions of perennial irrigation.

The results "demonstrate very clearly that the loss of suspended matter as the water traverses the canals and miskahs is very largely confined to the coarser material and as a result the deposit which reaches the land under the present system of irrigation has a tendency to form a heavier soil than that which would be obtained by the basin system. In this latter, almost the whole of the suspended matter is left on the land and the small part which may escape deposition consists of the very finest of the material. Its quantity is, however, very small."

The artesian water supply of eastern Florida, E. H. SELLARDS and H. GUNTER (*Fla. Geol. Survey Ann. Rpt., 3 (1910), pp. 77–195, pls. 6, figs. 11*).—This is a second paper on the water supply of Florida, the first dealing with the underground waters of central Florida (E. S. R., 19, p. 313).

It is stated that there are three principal areas in which flowing wells are found in Florida, namely, the Atlantic coast area, the Southern Gulf coast area, and the Western Gulf coast area. The Atlantic coast area is described in detail in this report. "This flowing area includes much of Nassau and Duval counties, and with the exception of local elevated areas all of St. Johns County; it follows the valley of the St. Johns River almost if not quite to the head waters, while a narrow strip reaches south along the Atlantic coast for 250 to 300 miles."

A brief account is given of the geology and soils of the region.

Sterilization of water on a large scale by means of ultraviolet rays (*Lancet [London], 1910, II, No. 25, pp. 1784–1786, fig. 1*).—The results of experiments with apparatus recently proposed for this purpose are summarized in this article.

SOILS—FERTILIZERS.

The gumbo soils of Iowa, W. H. STEVENSON and J. F. BARKER (*Iowa Sta. Bul. 119, pp. 284–305, figs. 2, map 1*).—The work here reported consisted of drainage, cultural, and fertilizer tests, and of physical and chemical analyses of Iowa gumbo soils. "The term 'gumbo' as used in this bulletin refers to heavy, black clay surface soil, and not to the almost impervious gray or yellow clay subsurface soil which geologists refer to as gumbo and which is locally often called hardpan."

The soils are classed with the heaviest clays, based on analyses which showed 90 to 97 per cent of silt and clay, the remainder being very fine sand. The clay content ran from 25 to 50 per cent, and is believed to be a water deposit of recent origin, the rock flour being carried down from melting glaciers.

Chemical analyses of the soil showed an average of only 0.3 per cent of nitrogen, 0.040 per cent of phosphoric acid, and 2.06 per cent of lime, but only a trifling amount of the lime was present as carbonate. The percentage of organic matter was found to be relatively low.

Tile draining was successful wherever a good outlet could be had. The soil was improved by fall plowing, and the use of clover or some green manure. The use of lime, even in large amounts, did not seem to improve the physical properties of the soil.

The management of heavy clay soils, A. R. WHITSON and E. J. DELWICHE (*Wisconsin Sta. Bul. 202, pp. 3–17, figs. 6*).—This bulletin is based upon observations and experiments made at the Superior and Ashland substations and elsewhere in the State.

"The most extensive class of clay soils which is at all heavy is that known as the heavy red clay, which occurs along the southern shores of Lake Superior, in the valley of the Fox River, and to a much less extent along the shore of Lake Michigan. The total area of this type is estimated at 3,000,000 acres. Smaller areas of moderately heavy clay soils occur in other sections of the State. When properly managed, these soils are very productive, their very fineness giving them a large water-holding capacity which adapts them especially to small grains and grasses. The largest areas of this clay are located where there are climatic conditions favorable to these crops."

The principal defect of these soils is the tendency to pack and thus become difficult to cultivate. The means suggested for overcoming this difficulty include the exercise of great care to plow only when the soil is in proper moisture condition, to drain, and to practice a 4 or 5 year rotation, including clovers, small grains, and tilled crops such as corn, potatoes, and rutabagas. It is also considered "necessary to add considerable vegetable matter by turning under an occasional second crop of clover or other legume as well as by using all available manure. Clay soils rarely contain much humus even in the natural state. The supply of phosphorus is also limited and should be increased by the addition of phosphate fertilizer supplementing farm manure."

The improvement of sandy soils, A. R. WHITSON and F. J. SIEVERS (*Wisconsin Sta. Bul. 204, pp. 25, figs. 6*).—It is stated that "Wisconsin contains between four and five million acres of soil which farmers generally classify as 'sandy.' Approximately three million acres of these lands lie in the central and southern portions of the State and are already settled and in farms. The remaining area, between one and two million acres in extent, occurs chiefly in three sections of the northern part of the State; one in the northeast, another in the north-central portion, largely in Oneida and Vilas counties, and the third in the northwestern portion."

From observations and experiments on such soils in different parts of the State the authors recommend a system of cultivation, cropping, and fertilizing which is designed to supply the deficiency of these soils in organic matter and nitrogen, phosphoric acid, and potash, correct acidity, and improve their physical condition.

The development of marsh soils, A. R. WHITSON and F. J. SIEVERS (*Wisconsin Sta. Bul. 205, pp. 22, figs. 8*).—It is stated that "Wisconsin has between two and one-half and three million acres of marsh lands. While a part of this area is in large marshes of 25,000 to 100,000 acres, by far the largest area occurs in smaller tracts scattered over a large portion of the State. The only considerable part of the State largely devoid of marsh land is in the extreme southwestern section. As a result of the wide distribution of these lands, thousands of farms contain a small area of this class of soil."

Observations and experiments on soils of this character in different parts of the State led to the conclusion that with proper drainage and soil management much of this land can be made very productive. The first requirement is the organization of drainage districts to secure drainage on a large scale.

"Proper tillage of marsh lands is of the utmost importance. Heavy rolling, by packing the loose peat soil, produces a firmer seed bed which is better adapted to cultivated crops, especially small grains.

"Fertilization of marsh soils is important on account of the unbalanced condition of the elements which they contain. Marsh soils are excessively rich in nitrogen, but are frequently deficient in phosphorus and potash. While barnyard manure will supply the last two elements, these can be supplied in commercial fertilizers, allowing the use of barnyard manure on upland soils where its nitrogen as well as its mineral elements are needed. Under such special conditions it is profitable to use commercial fertilizers supplementing the manure of the farm.

"Acidity develops in marsh soils quite commonly where lime carbonate is not brought in from surrounding higher land. This acidity, however, does not interfere with the growth of crops provided the soil is properly fertilized. Very commonly acid soils require phosphate fertilizers as well as potash. The acidity of marsh soils in the southeastern part of the State is very generally neutralized by the lime carbonate in the water seeping in from the surrounding higher lands of this limestone section.

"The crops best adapted to marsh lands include corn, potatoes, cabbage, buckwheat, and timothy and alsike clover for hay. When the soil is thoroughly firmed by rolling, small grains can be grown, of which wheat and barley are best, with oats and rye second. Excellent tame grass pastures can be developed on these marshes with proper care."

Contribution to the theory of soil drainage, E. KRÜGER (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1911), No. 3, pp. 147–163, pls. 3, figs. 6*).—The author discusses Spöttle's theory of soil drainage, and reports results of drainage investigations from which the following conclusions are drawn:

As the distance from the drain increased the effect of drainage on the water level was in proportion to the square root of the depth, and was the same for heavy and light soils. Given the same distance between drains, the drainage of a field was more uniform for a pervious than for an impervious soil. The discharge increased with the permeability of the soil, but was substantially less rapid than the latter. However, the increase in discharge was greater with deeper than with shallower drains, thus showing the superiority of the former.

Lysimeter investigations, 1910, E. Krüger (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1911), No. 3, pp. 163–174*).—From results of investigations in which the relations between precipitation, leaching, and evaporation were studied with soils receiving normal amounts of potash, phosphoric acid, and nitrogen fertilizers, and using rye as a crop, the author concludes that the amount of water leached out of a fallow soil for the year was 55 per cent of the rainfall, as compared with 20 to 25 per cent for a cropped soil.

During the months of greatest crop growth the amount of water leached out was from 1 to 3 per cent of the rainfall for the cropped soil as compared with 60 per cent for the fallow soil. During the time of heaviest application of water (in May) only 0.02 mm. was leached out, which indicates that during the period of plant growth large quantities of water may be applied to the soil without danger of leaching. The amount of water evaporated was much greater in the cropped than in the fallow soil, being 3.7 mm. and 0.9 mm. per day respectively. The amount of water evaporated for the year was 76 per cent of the precipitation.

The amount of water transpired by the plants was small during winter but considerable during the growing period. From October to June an average of 488 lbs. of water was required for the production of 1 lb. dry matter, as compared with 348 lbs. of water from April to June. The amount of water transpired by the plant from October to June per pound of plant substance produced was 234 lbs. as compared with 219 lbs. from April to June.

The water requirements of the plants increased rapidly with their growth. The amount of water evaporated from the soil after harvesting was greatly reduced by cultivation, and such reduction of evaporation from the soil increased leaching.

Investigation on the adequacy of nutrients in forest soil, H. Vater (*Tharand. Forstl. Jahrb., 59 (1909), No. 2, pp. 213–260; Naturw. Ztchr. Forst u. Landw., 8 (1910), No. 12, pp. 570–577*).—The law of minimum, especially as applied to plant food in forest soils, is discussed, and experiments during 2 years with fertilizers on a forest soil on which spruce and pine seedlings were grown are reported.

As a rule nitrogen was the element present in minimum amount in the soils experimented with, and next to nitrogen phosphoric acid was the most deficient constituent. The growth of spruce and pine seedlings on unfertilized soil varied between 7 and 48 per cent of that on fully fertilized soil. The results from liming were irregular and inconclusive. The application of fertilizers reduced the amount of water required to produce a unit weight of growth.

The absorptive capacity of soils from the physico-chemical standpoint, U. Pratolongo (*R. Ist. Lombardo Sci. e Let. Rend., 2. ser., 43 (1910), No. 16, pp. 542–555; abs. in Chem. Zentbl., 1910, II, No. 24, p. 1773*).—The author concludes from his investigations that the compounds which determine the absorptive capacity of soils may be divided according to the phase rule only into solid solutions and absorptive compounds. A study of their behavior toward solvents indicates that they are entirely or almost exclusively absorptive compounds.

Tests of an osmotic theory of plant distribution, G. Gola (*Ann. Bot. [Rome], 8 (1910), No. 3, pp. 275–548, pls. 2*).—This article sets forth at length the author's investigations on the relation between the natural distribution of plants and the composition and concentration of soil solutions in its bearing upon osmotic pressure. He proposes an elaborate classification of soils and plants on this basis.

Clod analysis, a means of determining soil structure, H. Puchner (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 4, pp. 38–40*).—The author describes a method of clod analysis which he has used with satisfactory results in determining the structure of cultivated soils and in studying the thoroughness of cultivation with different forms of tillage implements.

By means of sieves the soil samples are separated into crumbs (Krümel) less than 20 mm. in diameter, fine clods (Brocken) 20 to 40 mm. in diameter, and clods (Klumpen) over 40 mm. in diameter. Examinations of a number of samples of cultivated and uncultivated soils taken at different depths from the surface down to 400 mm. are reported.

The formation and properties of humus substances, P. Ehrenberg (*Chem. Ztg., 34 (1910), No. 130, pp. 1157, 1158; abs. in Chem. Zentbl., 1910, II, No. 24, p. 1773; Chem. Abs., 5 (1911), No. 6, pp. 1147, 1148*).—This article briefly summarizes the work of the author and other investigators on different kinds of humus and humus-like substances derived from different sources by various natural and artificial processes.

The author calls attention to the fact that while comparatively little is known of the actual composition of such substances, apparently two classes of compounds are produced in the process of humus formation, (1) those derived from carbohydrates and having an acid reaction, and (2) those derived from benzol derivatives and having an alkaline reaction. The importance of further investigations on the composition and properties of humus is emphasized.

The question of the study of humus substances, C. Blacher (*Chem. Ztg., 34 (1910), No. 148, pp. 1314, 1315*).—Observations on the behavior of humus compounds in boiler water are recorded.

On the escape of ammonia from manure during and after hauling to the field, P. Liechti and E. Ritter (*Landw. Jahrb. Schweiz, 24 (1910), No. 7, pp. 481–525, pl. 1, figs. 3*).—The authors report investigations from which they conclude that the loss of ammonia during the hauling of manure is so small that it may be entirely disregarded, but that the loss under the usual methods of applying manure to the soil is considerable. A special piece of apparatus was designed and used to determine the ammonia given off into the air under different methods of application of manure.

The losses of ammonia were found to be especially large when the manure was applied on snow, amounting in the course of a few days to one-third or more of that in the manure, and this is considered less than would actually occur under ordinary methods of manuring. The loss was determined to a large extent by the temperature. With temperatures above 0° C. the loss on snow-covered soil was very small. At temperatures below 0° the losses were greater.

The importance of peat for the manufacture of nitrogenous fertilizers, R. Schorr (*Jour. Amer. Peat Soc., 3 (1911), No. 3–4, pp. 226–232*).—Data are presented to show that the present sources of nitrogenous fertilizers are inadequate, and the advisability of investigating the possibility of using peat for this purpose is suggested. The efficiency of various processes which have been proposed for the manufacture of nitrogenous compounds from peat is briefly discussed.

Problems in peat filler production, J. N. Hoff (*Jour. Amer. Peat Soc., 3 (1911), No. 3–4, pp. 192–201*).—It is stated that there are at the present time four or five plants producing peat filler in the United States in commercial quantities, the total output being perhaps from 15,000 to 20,000 tons per year. The methods used are described. The author is of the opinion that peat makes an ideal filler, although objection has been raised to it on account of the low availability of the nitrogen as compared with that of blood, tankage, or ammonium salts.

The world movement of nitrogen in 1910, A. Bertrand (*Engrais, 26 (1911), No. 7, pp. 180–194, dgms. 10*).—Statistics of production and consumption of nitrate of soda and ammonium sulphate are graphically presented.

Nitrate of soda (*Chem. Trade Jour., 48 (1911), No. 1236, pp. 74–77*).—It is stated that according to the figures given out by the Nitrate Syndicate the production in 1910 was 2,436,182 tons, an increase of 350,253 tons over 1909. As a result of lower prices there was a large increase in consumption, especially in France, Germany, Belgium, Holland, and the United States. It is estimated that the average price in Europe during 1910 was about $5 less per ton than in the previous year.

Nitrate of soda in a Texas county, W. B. Phillips (*Manfrs. Rec., 58 (1910), No. 5, p. 53*).—A brief account is given of the discovery of a deposit of nitrate of soda in Presidio County, about 45 miles south of Valentine, Texas, and analyses of samples of material containing from 5 to 71 per cent of nitrate of soda are reported. The alleged deposits have been very incompletely examined.

Ammonia production in 1910, W. N. McIlravy (*Engin. and Min. Jour., 91 (1911), No. 1, p. 87*).—The estimated production of ammonia, reckoned as sulphate of ammonia, in the United States in 1910 is 116,000 tons as compared with 106,500 tons in 1909. The increase was derived largely from coke ovens. The consumption of sulphate of ammonia in the United States in 1910 is estimated to have been 178,000 tons, representing an increase of 55 per cent in imports of this material. The prices of the sulphate increased during the year and the outlook for the future is thought to be good.

Sulphate of ammonia (*Amer. Fert., 34 (1911), No. 3, pp. 15–19*).—This is an abstract of an annual review of the sulphate of ammonia market during 1910, giving statistics of production and consumption throughout the world, but especially for the United Kingdom. The total world's output is given as 1,100,000 tons, or a little less than half that of nitrate of soda; of the United Kingdom 369,000 tons; of Germany 375,000 tons; and of the United States 116,000 tons.

Recent progress in the fixation of atmospheric nitrogen, J. B. C. Kershaw (*Chem. Trade Jour., 48 (1911), No. 1236, pp. 87–90, figs. 6*).—This article records the fact that there has been marked progress recently in the commercial application of processes for the fixation of atmospheric nitrogen, and states that 100,000 horsepower is now used for this purpose with a prospect that the amount will be doubled during 1911.

Works at Niagara Falls, Canada; Notodden, Christiansand, and Rjukan, Norway; Patsch, near Innsbruck, Austria; La Roche de Rame, Savoy; and Freiburg, Saxony, are briefly described. Contemplated works at a number of other places are referred to.

The processes used are of two classes, those fixing the nitrogen in the form of calcium cyanamid and those producing nitric acid by the direct oxidation of the nitrogen of the air in the electric flame. The principal process belonging to the first class is that of Frank and Caro; the principal process of the second class is that of Birkeland and Eyde. A number of new processes for the oxidation of the nitrogen of the air have, however, been recently proposed, including the Pauling and Schönherr processes, and numerous patents on other processes have been applied for. Much investigation has recently been devoted to the subject of increasing the efficiency of the methods with promise of decided progress in this direction. For example, Haber and König have patented a process of reducing pressure and cooling the arc flame by which gases containing from 9.5 to 10 per cent of nitric acid can be produced when using air and 13.5 to 14 per cent when using a 50 per cent mixture of oxygen and nitrogen gas.

The fixation of the nitrogen of the air, BACHMANN (*Naturw. Wohnschr., 26 (1911), No. 5, pp. 65–69*).—Various processes which have been devised for this purpose are described and the importance of the fixation of nitrogen in relation to increasing means of supporting life is discussed.

The knowledge of lime nitrogen, N. CARO (*Ztschr. Angew. Chem., 23 (1910), No. 51, pp. 2405–2417; abs. in Chem. Ztg., 35 (1911), No. 8, Repert., p. 32*).—The results of investigations on the following subjects are summarized: The silver salts of cyanamid and dicyandiamid, the quantitative separation and determination of cyanamid and dicyandiamid, the determination of urea in lime nitrogen, the determination of cyanid in the presence of cyanamid and dicyandiamid, the action of cyanid on carbid, the action of carbon dioxid on lime nitrogen, the action of nitrogen on carbid and alumina, the preparation of pure cyanamid out of its salts, and the action of nitrogen on a mixture of barytes and lime and the influence of added substances on the carbid-forming mixture.

Potash salts: Their uses and occurrence in the United States, W. C. PHALEN (*U. S. Geol. Survey, Advance Chapter from Mineral Resources of the United States, Calendar Year 1910, pp. 24*).—This article discusses the German potash deposits, the uses made of potash salts, the value of the imports into the United States, and the possible sources of potash in the United States.

It is stated that the United States imported $11,000,000 worth of potash salts during 1910. A large proportion of these salts is used in the manufacture of fertilizers. The possible sources of potash in the United States referred to are igneous rocks, green sand marls, waters of salt lakes in various parts of the West, alkali deposits, salt deposits in Michigan and elsewhere, wood ashes, seaweed, wool scourings, and beet-sugar molasses and residues.

The potash industry and the American farmer, A. B. REEVE (*Amer. Rev. of Reviews, 43 (1911), No. 253, pp. 212–214, fig. 1*).—This article describes briefly the potash deposits of Germany and discusses the conditions leading up to and involved in the controversy between the German producers and American purchasers of potash.

Potash for over 600,000 years (*Amer. Fert., 34 (1911), No. 3, pp. 20, 21*).—This is a translation of an article by Ochsenius, published some time ago, in which it is estimated that the potash deposits of Germany are sufficient to supply the needs of the world for over 600,000 years.

Other potash deposits (*Amer. Fert., 34 (1911), No. 3, pp. 34–36*).—This is a translation of an article by H. Erdmann (E. S. R., 22, p. 718) describing the location, extent, and probable commercial value of the known deposits of potash salts outside of Germany.

Phonolite as a fertilizer, M. POPP (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 5, pp. 52–57*).—Experiments begun in 1909 (E. S. R., 22, p. 325) were continued in 1910 to study the after-effects of phonolite as compared with potash salts.

The results confirm the conclusions from the earlier experiments and show that phonolite is in no way comparable with potash salts as a fertilizer. The results the second year were no better than in the year previous. The potash in the phonolite was for the two years about 50 per cent as effective as that of potash salts.

Feldspar as a source of potash, F. J. MACHALSKE (*Amer. Fert., 34 (1911), No. 5, pp. 17–20*).—The principal potash feldspars and the various processes for rendering the potash available which have been patented are described.

Florida phosphate industry in 1910, C. G. MEMMINGER (*Engin. and Min. Jour., 91 (1911), No. 5, p. 264*).—It is stated that little of commercial or technical interest with reference to the Florida phosphate industry occurred during this year. There was a marked decrease in production of hard rock phosphate and an estimated increase of 18 per cent in production of land pebble. As a result of low prices no new plants were erected. The low prices are said to have been due not to lack of demand but "to the present unfortunate method of selling whereby there is unnecessary and undue competition. As before pointed out, the only beneficiary under existing conditions is the manufacturer of superphosphate, who is thereby enabled to purchase his crude phosphate at a minimum figure, and on account of the active demand for fertilizers is enabled to sell his manufactured product at high figures. The producer and the consumer suffer; the intermediary or manufacturer profits."

[Fertilizer markets, 1910] (*Oil, Paint and Drug Reporter, 79 (1911), No. 9, pp. 55–57*).—Reviews are given of the fertilizer market in New York, Baltimore, Charleston, and Philadelphia.

A large increase, variously estimated at from 15 to 25 per cent, in the fertilizer business of the United States during 1910 is reported. The increase was especially large in the South. There was a marked increase in the consumption of sulphate of ammonia, which was met by increased importations, especially from Great Britain, and by an increase of domestic production as a by-product from coke ovens. There were large increases in the production and consumption of nitrate of soda accompanied by a marked fall in prices. The practical failure of the menhaden fisheries during 1910 resulted in very high prices for fish ammoniates. The production of Florida hard rock phosphate declined and of pebble phosphate increased during the year. There was a large rate of increase in imports of potash salts growing partly out of the unsettled conditions resulting from the potash controversy.

Analysis of fertilizers, R. E. Rose and L. Heimburger (*Fla. Quart. Bul. Dept. Agr., 21 (1911), No. 1, pp. 6, 7, 9–15, 22–39, 45–82*).—An account is given of the fertilizer inspection during 1910, including analyses of fertilizers, with notes on laws and regulations and the valuation of fertilizers.

Analyses of fertilizers (*Rpt. Ill. Bd. Agr. Anal. Fert., 1910, pp. 10*).—This is a report on fertilizer inspection in Illinois during 1910, giving analyses of fertilizers and the text of the state fertilizer law.

Commercial fertilizers, B. H. Hite and F. B. Kunst (*West Virginia Sta. Bul. 132, pp. 5–52*).—This bulletin reports the results of analyses of commercial fertilizers inspected during the year 1910. It is stated that with few exceptions, manufacturers of commercial fertilizers doing business in West Virginia "are making every reasonable endeavor to provide the quantity of every constituent guaranteed."

AGRICULTURAL BOTANY.

Action of anodic and cathodic liquids on germination, H. Micheels (*Acad. Roy. Belg., Bul. Cl. Sci., 1910, No. 5, pp. 391–403; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 576, II, p. 883*).—In a previous publication (E. S. R., 23, p. 627) the author showed that the influence on germination of wheat in nutrient solutions through which a galvanic current had been passed was due to changes in the solutions. In the present paper he gives the results of further investigations on the changes induced by the electric current.

Centinormal solutions were used, and it was found that the germination was accelerated by the cathodic liquor of sodium nitrate or chlorid more than was the case with the anodic solutions. A mixture of the two gave intermediate results, and an unelectrolyzed solution was better than any of the others. Similar results were obtained for potassium nitrate and chlorid, except that the cathodic liquor of potassium nitrate favored leaf growth more than the unelectrolyzed solution. For mixtures of potassium and sodium chlorid the unelectrolyzed solution gave the best results.

In experiments carried on with Mucor the anodic solutions gave the best development, indicating that the protoplasm of the fungus differs somewhat from that of higher plants.

Filtering the solutions had practically no effect on their activity.

Concerning the action of an alternating current on germination, H. Micheels and P. De Heen (*Acad. Roy. Belg., Bul. Cl. Sci., 1910, No. 8, pp. 665–668*).—In continuation of the above investigations, the authors compared the effect of galvanic currents of high and low frequency, previous results having showed a favorable action for an alternating current of high frequency.

In the present paper it is shown that a continued galvanic current had a detrimental effect on germination. A weak alternating current from 6 Daniell cells did not favor the growth of roots or weight of seedlings, but it did cause an increase in the length of the leaves. Where the current was increased the results were comparable with those obtained by cathodic solutions, as explained above.

The effect of salts on the respiration of plants, A. Reinhard (*Ber. Deut. Bot. Gesell., 28 (1910), No. 9, pp. 451–455*).—In continuation of some previous experiments (E. S. R., 24, p. 328), the author has repeated his experiments with peas, testing the effect of a number of salts in solutions upon the respiration of the ground pea seed. Peas of the variety Victoria were ground and mixed with distilled water and salt solutions until a thick paste was formed, after which the respiration was investigated.

Neither potassium nitrate, potassium phosphate, magnesium sulphate, calcium nitrate, nor iron chlorid in dilute concentrations had any effect on the respiration of the ground seed, even when the experiment was prolonged for a considerable time. Potassium nitrate and calcium nitrate showed no stimulating effect but rather had an injurious influence on the respiratory enzyms.

Origin of osmotic effects.—III, The function of hormones in stimulating enzymic change in living structures, H. E. and E. F. Armstrong (*Proc. Roy. Soc. [London], Ser. B, 82 (1910), No. B 559, pp. 588–602; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 576, II, pp. 883, 884*).—It has been shown that when a leaf of cherry laurel is exposed to the vapor of an anesthetic, hydrogen cyanid is liberated, and that not only the common anesthetics but many organic vapors have a similar effect. Weak solutions of mineral acids, alkalis, and salts are inactive, but the simpler organic acids all pass into the leaf from solutions. The behavior of the laurel leaf resembles very closely that of the barley grain (E. S. R., 21, p. 126).

It is proposed to divide substances other than colloids into 2 classes, according as they will or will not pass through the differential septa, such as occur in the barley grain and the laurel leaf. For those that will pass through the septa the term "hormone" has been suggested.

Experiments show that water passes into the leaf together with the hormone, and the hypothesis is advanced that, when introduced into the living cell, substances which are not attractive to water exercise stimulative effects that are primarily mechanical. The molecules of the hormone are interposed between the molecules in the cell by the change in the osmotic state, and an influx of water from other regions takes place. It is thought that probably the mere dilution thus effected is determinative of any changes produced. Degenerative changes which are set up tend to increase in intensity as the products of change exercise a stimulative influence, and gradually enzyms are set free which can attack the various hydrolytes stored in the cell.

The phenomena of change in living structures are said to apply to organisms in general, and this hypothesis, it is believed, will afford an explanation of a number of more recent observations on plant metabolism.

Investigations regarding the phloem and food conduction in plants, F. U. G. Agrelius (*Kans. Univ. Sci. Bul., 5 (1910), No. 10, pp. 169–179, pls. 2*).—A special study has been made of the devices for the transfer of food materials in the phloem of vascular plants, comparisons studies being made of the phloem in stems, petioles, and fruit stalks, of 72 species of plants, representing 65 genera and 39 families.

The special devices for the lateral transfer of food present in the phloem and cortex of plants are said to be the pitted cells, the arrangement of the phloem in narrow wedges, and the radially elongated medullary-ray cells which are especially adapted to conduct the food. The second device was found to be the sieve tubes, and they were demonstrated in all but three of the plants examined

Phototaxis, assimilation, and growth, P. A. Dangeard (*Bul. Soc. Bot. France, 57 (1910), No. 5, pp. 315–319*).—A résumé is given of observations on the influence of light on various organisms, in which certain greenish colored bacteria were found to arrange themselves in definite parts of the spectrum.

A brief account is also presented of a method of determining the assimilation of various species of algæ through the liberation of oxygen, and the effect of various colored screens corresponding to definite portions of the spectrum on the growth of algæ is described.

Metabolism and translocation in young conifers, H. Bauer (*Naturw. Ztschr. Forst u. Landw., 8 (1910), No. 10, pp. 457–498*).—The results are given of a chemical investigation into the metabolism and translocation taking place in coniferous seedlings. Larch, hemlock, fir, and pine seedlings were used in the experiments, and the variation of their nitrogen and principal inorganic constituents was determined, analyses being made at 4 different periods, which corresponded to the times when growth was just beginning, when the new organs were beginning to appear, at the full height of growth, and at its autumnal cessation. The results are given in tabular form.

The morphology of leaf fall, E. Lee (*Ann. Bot. [London], 25 (1911), No. 97, pp. 51–106, pls. 3, figs. 20*).—The results are given of an anatomical study of various species of dicotyledonous plants, in which an attempt was made to determine the morphology of leaf fall.

It was found that in dicotyledonous plants the essential modification at the leaf base in connection with leaf fall is the formation of a separation layer which is produced from existing cells with or without division. The leaf separates from the stem by the disappearance of the middle lamellæ of the cells of the separation layer and the subsequent rupture of the sieve tubes and vessels of the leaf trace. A lignified layer may or may not be present, but a protective layer is invariably produced either before or after leaf fall. This protective layer is formed by ligno-suberization of the cells of the leaf base, or of cells produced by the continued division of a regular cambium. The protection of the tissues of the stem underlying the leaf scar is aided at a later date by the production of a layer of cork cells.

In many species the persistent leaf or leaf scar is thrown off during the second year.

Recent investigations on the glucosid of pear leaves and its rôle in autumn coloration, E. Bourquelot and Mlle. A. Fichtenholz (*Jour. Pharm. et Chim., 7. ser., 3 (1911), No. 1, pp. 5–13; Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 38, pp. 605–607*).—Subsequent to their discovery of a glucosid, arbutin, in pear leaves (E. S. R., 24, p. 31), the authors have examined leaves of a considerable number of species that have been referred to the genus Pyrus and they have been unable to find arbutin in any except the species producing the fruit known as the pear. On this account they think the test could be used in differentiating the species into separate genera. The proportion of arbutin was found to vary in pear leaves according to the stage of growth; however, it was still to be found at the end of the growing season.

A study was made of the relation of arbutin to autumn coloring of pear leaves, and some varieties were found to blacken, as claimed by Weevers (E. S. R., 24, p. 138), due to the oxidation of the arbutin. In some varieties, however, the leaves turn yellow instead of black, and this is attributed to the presence of methylarbutin in conjunction with the common glucosid. The methylarbutin hydrolyzes more rapidly than arbutin and results in a yellow coloration.

The behavior of tannin in persimmons, with some notes on ripening, F. E. Lloyd (*Plant World, 14 (1911), No. 1, pp. 1–14, pl. 1*).—A study has been made of the tannin in persimmons with special reference to changes taking effect on ripening.

The author found that the tannin in the tannin cells of the unripe fruit does not exist wholly in a watery solution, but is rather associated in part with a carrier somewhat analogous to a gelatin, albumin, or other colloid-tannin compound. The insolubility of the tannin in the ripe fruit is due to its intimate and complete association with the carrier, with which it unites. The behavior of the tannin is considered analogous to that of other substances which are rendered insoluble by combination.

The final stages of ripening of this and similar fruits are believed to be independent of living protoplasm, and this conclusion is confirmed by experiments in which chemical agents have been used to induce ripening earlier or more rapidly than normal.

In the normal tissue there is no intercellular tannin. When such occurs it is probably due to the bursting of the tannin cells through bruising or other injury. The capacity for imbibition on the part of the tannin masses sufficient to burst the cell wall is not associated with astringency to the taste during the whole of the period of ripening when such bursting is possible.

In the course of the investigations the author obtained evidence showing that the cell walls of the pulp are digested and that they are not composed of true cellulose, but pectocellulose.

It is probable that the above conclusions are applicable to the ripening of the date.

The effect of the frosts of the winter of 1908–9 on vegetation, F. J. Chittenden (*Jour. Roy. Hort. Soc. [London], 36 (1910), No. 2, pp. 358–404*).—The author gives detailed accounts of the effect of abnormal temperatures occurring in England on the growth of a large number of introduced plants.

Plant acclimatization in southern Arizona, J. J. Thornber (*Plant World, 14 (1911), No. 1, pp. 15–23*).—The author gives an account of observations on attempts to acclimatize plants in southern Arizona, in which perennial plants from temperate zones were subjected to high summer temperatures and those from subtropical and tropical regions to possible frost. These two factors seem to be the limiting ones in determining the possibility of introducing a considerable number of economic and other plants. Notes are also given on the influence of soil, soil water, elevation, etc., on the introduction of plants.

The weeds of arable land in relation to the soils on which they grow, Miss W. E. Brenchley (*Ann. Bot. [London], 25 (1911), No. 97, pp. 155–165*).—An attempt has been made to ascertain how far weeds of arable lands are characteristically connected with particular soils and crops.

There was found to be a definite association between the species of weeds of arable lands and the soil on which they grew. The determining factor is the texture of the soil and not the geological formation from which it is derived, except with soils overlying chalk. The crop has very little influence on weeds except in the case of seed crops, which probably smother out a large number of species which would normally occur. Certain weeds were found to be definitely symptomatic of particular types of soil, though the majority of weeds are not strictly circumscribed in this respect.

Physiological aspects of fertilization and hybridization in ferns, W. D. HOYT (*Bot. Gaz., 49 (1910), No. 5, pp. 340–370, figs. 12*).—An account is given of an investigation into the hybridization and fertilization of ferns. The results of the author's experiments were negative, but they are considered as indicating the nonoccurrence of hybrids among ferns.

The author studied the entrance of sperms into the archegonia, and the entrance was obtained in every combination of species tried. When the egg and sperms were of the same species 37 fusions resulted, but when of different species they failed to give a single fusion. The author believes from this evidence that hybrids are not formed among this class of plants.

Do ferns hybridize? R. C. BENEDICT (*Science, n. ser., 33 (1911), No. 842, pp. 254, 255*).—In reviewing the above paper, the author criticizes the methods and states that while it is quite true that experimental proof of the kind attempted by Hoyt is lacking, yet no one has ever observed the development of a suspected hybrid from before the period of fusion of the gametes. He claims that Hoyt's arguments against fern hybridity apply with practically equal force to most cases of accepted hybridity among flowering plants and animals.

It is said that there are a considerable number of reputed fern hybrids which possess all the characters generally recognized as characteristic of hybrids, and that the only reasonable explanation of their existence is to identify them as has been the custom.

The rules of Naudin and Mendel's law relative to the segregation of hybrids, L. BLARINGHEM (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 2, pp. 100–102*).—Attention is called to a memoir presented by Naudin to the Academy of Sciences, Paris, in 1861, giving the results of 8 years' experiments on the hybridization of Papaver, Mirabilis, Primula, Datura, Nicotiana, Petunia, Digitalis, and Linaria, from which some generalizations were deduced. These rules of Naudin are said by the author to be general principles, and the laws of Mendel are considered by him as special applications.

The two principles laid down by Naudin are as follows: (1) First generation hybrids of the same cross or reciprocal crosses will resemble each other as much or nearly as much as different individuals of any recognized species; (2) fertile hybrids and those fertilized among themselves will revert sooner or later to the specific types from which they are derived.

The author gives an account of the behavior of some crossbred barleys, the segregation of which conforms to the above rules rather than to those of Mendel.

The mutation theory, II, H. DE VRIES, trans. by J. B. FARMER and A. D. DARBISHIRE (*Chicago and London, 1910, vol. 2, pp. VIII+683, pls. 6, figs. 149*).—This volume completes the translation of the author's work on Die Mutations Theorie, the previous one having been noted elsewhere (E. S. R., 22, p. 625). In it some of the data relating to the origin of horticultural varieties are collated. This is followed by discussions of the origin of a number of eversporting varieties and their relation to the author's theory, with concluding chapters on the relation of the mutation theory to other branches of inquiry.

On the inheritance of the yellow tinge in sweet pea coloring, Mrs. M. G. Thoday (Sykes) and D. Thoday (*Proc. Cambridge Phil. Soc., 16 (1910), No. 1, pp. 71–84*).—A descripion is given of experiments begun in 1906 on the nature and inheritance of the yellow tinge in scarlet, salmon, and deep cream-colored sweet-pea flowers. Several crosses were made and the offspring grown as far as the F_2 generation. Those resulting from a cross of Queen Alexandra and Dorothy Eckford were carried on to the F_3 and F_4 generations, and the authors describe the segregation according to color characteristics.

The deep yellow tinge in Queen Alexandra, deep salmon, and deep cream sweet-pea flowers was found to depend on 3 coincident recessive characters. Microscopial examination showed that one of the factors imparting a tinge to the whole flower, producing self-colored forms, affects the sap only, tinging it deeply. The second similarly imparts to the sap a tinge which is fainter and is commonly associated with a few yellow plastids. The third factor, which chiefly affects the standard, is connected with the occurence of large clusters of golden-yellow plastids in the cells.

A spineless mutation of Cynara cardunculus, L. Trabut (*Bul. Soc. Bot. France, 57 (1910), No. 5, pp. 350–354, pls. 2*).—The author reports the occurrence in Algeria of a spineless form of the wild cardoon which differs only in the unarmed character of the plant. It is believed that the spineless form will prove a valuable acquisition.

International catalogue of scientific literature. M—Botany (*Internat. Cat. Sci. Lit., 8 (1910), pp. VIII+949*).—This is the eighth edition of the International Catalogue (E. S. R., 23, p. 431), about 7,500 articles being indexed. The literature is mostly that of 1908, although there are some titles included earlier than that and a few entries of 1909.

FIELD CROPS.

A report of seven years' investigation of dry farming methods, L. A. Merrill (*Utah Sta. Bul. 112, pp. 95–162, figs. 15*).—A progress report of the first season's investigations has been previously noted (E. S. R., 16, p. 862).

The results of variety tests made are briefly summarized in the following table:

Yields of the more productive varieties tested.

Crop.	County.	Period of test.	Number of varieties tested.	Leading variety.	Average yield.
					Bus.
Fall wheat	Juab	1904, 1906–8	10	Turkey	32.7
Do	Tooele	1904–1908	7	Gold Coin	18.3
Do	do	1904–1908	7	Kofod	18.0
Do	Washington	1907, 1908	7	Lofthouse	30.1
Do	Iron	5 years	6	Turkey	7.5
Do	Sevier	5 years	4	do	11.6
Macaroni wheat	Juab	1904–1907	4	Medeah	14.6
Oats	do	1904–1908	4	Sixty Day	30.5
Barley	do	1903–1910	4	California Prolific	25.7
Do	San Juan	1903–1910	3	California	22.8
Do	Washington	1903–1910	2	Highland Chief	12.8
Spring oats		1910	4	Black American	8.4
Spring wheat		1910	4	New Zealand	2.0
Durum wheat		1910	4	Khala	3.1
Potatoes	Juab	1908	10	Early Breakfast	52.33
Do		1910	10	Green Mountain	54.0

From the tests made at the experimental farms the author feels justified in concluding that the "growing of macaroni wheats is inadvisable on our dry farms, at least for the present." Fairly good results were secured with the hemp crop. In alfalfa work it was impossible to distinguish in vegetative habit or yield among Turkestan, Sand Lucern, and Common Utah alfalfa. From 4 to 24 lbs. of seed were used, but on all the farms the lowest rate of seeding gave the best results. Planting in May or early June proved the most satisfactory. For seed production planting in rows or even in hills and intertilling proved most desirable. On the Juab county farm plats plowed in the fall of 1905 and in May, 1906, and seeded in September, 1906, yielded 35.4 and 33 bu. of wheat per acre respectively. Two plats devoted to a comparative test of spring and fall plowing at Nephi were practically equal in water content throughout the season.

" Extensive experiments . . . have not tended to confirm the importance of excessively deep plowing. . . . On the Juab farm where the soil is a heavy clay, there has not been a year when the 8 in. and 10 in. depths have not given better yields than the deep plowings. On the other farms the yields are slightly better for the deeper plowings, but certainly not enough better to warrant the extra expense incurred."

A rate of seeding test confirmed " the practice in vogue in this State, that of seeding 3 pks. per acre."

In Juab County wheat gave average yields during the period 1904 to 1908 of 26.9 and 18.3 bu. per acre respectively, when planted 1½ in. and from 2½ in. to 3 in. deep. The author concludes from these experiments and from practical experience "that on heavy clay soils seeding to a depth of from 1 to 1½ in. gives best results and that even in a sandy loam it is, as a rule, not safe to go beyond 3 in."

Other tests indicate that drilling one way gives better results than cross drilling or sowing broadcast. Practically no difference appeared in the height of plant, length of head, or yield of grain as a result of cross drilling. " The apparent superiority of the cross-drilled grain was due to the greater number of leaves on the plants."

A table indicates that the upper 6 ft. of soil on a fallowed plat properly cultivated contained 45 per cent more moisture than did soil that had been cropped for 7 years. Plats "cropped each year gave 73.7 bu. as compared with 83.4 bu. for the crop fallowed every other season." At the Juab county farm the average yield of Turkey Red wheat was 20.6 bu. per acre as compared with an average of 15.3 bu. for 4 common varieties. On land plowed in the ordinary way it yielded 18.6 bu. per acre as compared with markedly lower yields after plowing 5 in. and 10 in. deep and subsoiling 15 in. and 18 in. deep on 4 other plats. Sowing September 1 resulted in higher yields than sowing at any earlier or later date. Two winter barleys gave an average yield of 13.1 bu. per acre as compared with 1.2 bu. obtained from spring barleys in 1910.

The methods pursued and the results obtained in these cultural tests are stated in full and discussed.

Dry farming: A system of agriculture for countries under a low rainfall, J. A. WIDTSOE (*New York, 1911, pp. XXII+445, pl. 1, figs. 111*).—Successive chapters discuss dry farming as related to theoretical culture, rainfall areas, meteorology, soils, root systems of plants, the storage of water in the soil, the regulation of evaporation and transpiration, cultural methods, the selection and composition of crops, the maintenance of soil fertility, farm machinery, and irrigation. The history of dry farming in the United States is outlined, and its present status in different countries of the world is discussed. A bibliography of 84 titles is given.

References on plant breeding, C. FRUWIRTH (*Jour. Landw., 58 (1910), No. 3, pp. 251-271*).—Abstracts of a number of recent publications are presented.

The importance of the origin and improvement of grasses and clovers, H. WITTE (*Tidskr. Landtmän, 1910, pp. 13; abs. in Bot. Centbl., 114 (1910), No. 42, p. 416*).—Tables and descriptive text show the yielding power and other characters of varieties of clover and grass tested by seed improvement unions. The yields of varieties from foreign countries are graphically indicated, practical conclusions are drawn from experimental data, and the improvement of native forms is discussed.

Points on the indigenous and acclimated forage crops of Argentina, I, C. D. GIROLA (*Apuntes sobre algunas Forrajeras Indigenas y Aclimatadas de la República Argentina. Buenos Aires, 1910, pp. 132, pls. 10*).—The author devotes a separate chapter to each of the following: Brome grass (*Bromus unioloides*) crabgrass (*Digitaria sanguinalis*), yellow foxtail (*Setaria glauca*), meadow grass (*Poa annua*), rye grass (*Lolium brasilianum*), *Paspalum notatum*, spear grass (*Stipa* sp.), alfalfa (*Medicago sativa*), white clover (*Trifolium repens*), bur clover (*Medicago denticulata*), sweet clover (*Melilotus* sp.), and blueweed (*Echium plantagineum*). A botanical description of each is followed by a statement of its cultural and climatic requirements, the results of chemical analyses, and directions for its production.

[Experiments with field crops, Barbados, 1909–10], J. R. BOVELL (*Imp. Dept. Agr. West Indies, Rpt. Local Dept. Agr. Barbados, 1909–10, pp. 21*).—Each of the lines of work noted in preceding report (E. S. R., 23, p. 334), was continued in 1909–10. Tables report the strength and values of Sea Island, Silket, and other cottons; the yields, flavor, and other qualities of the sweet potatoes tested; the yields of economic colocasias, and meteorological data collected during 1909. During the year 25 legumes, most of which were edible, were grown to obtain seed for more extensive tests.

[Experiments with cotton and sugar cane] L. G. CORRIE and J. MITCHELL (*Ann. Rpt. Queensland Acclim. Soc., 46 (1909), pp. 10–16, 17, 18, 26, 27*).—Discussions of the distribution of varieties of sugar cane and of fresh importations accompany a report of the work. Average yields for 3 and 4 years on black soil were 10,120 lbs., 9,503 lbs., and 9,224 lbs. of saccharose per acre, respectively, for B6, 204, B3, 747, and B3, 922 as compared with 6,670 lbs. per acre produced by the standard variety White Transparent. A cotton gin was set up, but the little cotton that matured was of indifferent quality.

[Manurial experiments with potatoes and turnips], A. MACPHERSON (*Jour. New Zeal. Dept. Agr., 1 (1910), No. 5, pp. 375–379*).—On an exceptionally rich soil the lowest gain in yield of potatoes over the unmanured plat followed an application of 2 cwt. of superphosphate, 1½ cwt. of bone dust, and 1½ cwt. of dried blood, while the highest gain, nearly 1 ton per acre, followed an application of the same mixture with the addition of 1 cwt. of potassium sulphate.

A table states the results of applications of 7 different fertilizer mixtures to turnip plats on each of 8 different farms.

A successful alfalfa and truck farm in southeastern Ohio, W. A. LLOYD (*Ohio. Sta. Circ. 107, pp. 3–19, figs. 10*).—The author outlines the operations by a means of which net returns of $3,375 were obtained during 1909. The crops grown were alfalfa, corn, wheat, potatoes, melons, and vegetables. The farm is located 5 miles from an industrial community of "probably 16,000 to 18,000 people." Its soil and drainage and the owner's methods of management are stated.

Investigations of the phosphoric acid and potash requirements of meadows, P. LIECHTI (*Landw. Jahrb. Schweiz. 24 (1910), No. 4, pp. 357–384, pl. 1*).—The author reports in detail the results of fertilizer tests on 33 experiment fields in the Canton of Bern, Switzerland. Thomas meal, superphosphate, potash, calcium carbonate, and liquid manure were applied singly or in various combinations and amounts. Tables show the results obtained on each of the fields and as a whole, and indicate the percentages of the total potash of the soil which each of 14 field crops was able to abstract from a sandy loam.

Report of field trials on the liming of meadow land, 1906–1909, T. MILBURN and R. C. GAUT (*County Council Lancaster, Ed. Com., Agr. Dept., Farmers' Bul. 17, 1910, pp. 18*).—This publication summarizes results of earlier work (E. S. R., 19, p. 829) and reports subsequent studies.

The fourth crop since the first application of lime in 1906 indicates that cob lime, ground lime, and ground limestone have continued effective in increasing the crop yield. "Ground limestone has consistently given the largest crop . . . for the 4 seasons," as indicated by the average yields of each year. Applications of the 3 forms of lime were followed by 10, 16½, and 25¼ cwt. per acre respectively more hay than was secured on the unlimed plat during the 4 seasons. The profit per acre was more than twice as great in case of ground limestone as in case of ground lime, which in turn gave twice the profit secured from cob lime. Botanical analyses of the herbage of the ground limestone plats at the fourth cutting in 1909 showed a higher percentage of Yorkshire Fog (*Holcus lanatus*) on 2 farms, and a higher percentage of leguminous plants on all 3 farms.

Trials with different grass mixtures in 3-year meadows, 1883–1902, P. NIELSEN and E. LINDHARD (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 3, pp. 367–406*).—Trials were conducted at 4 stations to determine the influence of the different species of clovers and grasses in 36 different mixtures on the hay yield.

The results indicate that the selection of legume species is the most important factor in the composition of grass mixtures for 1 to 3 year meadows. If the legume does well, a good hay crop will be obtained; if not, the yield will be small. Under favorable conditions, a good clover and kidney vetch in mixtures will easily equal pure grass mixtures.

Yields of grasses of different species, 1879–1907, P. NIELSEN and E. LINDHARD (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 2, pp. 181–237*).—The investigation, which was commenced by the late P. Nielsen in 1879, covers trials with the following grasses: *Dactylis glomerata, Lolium perenne, L. italicum,* timothy, *Avena elatior, Festuca pratensis, F. duriuscula, Alopecurus pratensis, Holcus lanatus, Poa pratensis,* and florin grass (*Agrostis* sp.). The trials were conducted at 5 different experiment stations for a number of years, the seed used being obtained from domestic growers, from other European countries, and from America and Australia.

Seeding lawns and permanent pastures (*Ohio Sta. Circ. 106, pp. 2*).—This circular suggests methods and grass-seed mixtures for use in seeding lawns and permanent pastures.

Tests of Chile saltpeter under small grains, B. JANCSÓ (*Kisérlet. Közlem., 13 (1910), No. 6, pp. 712–733*).—These pages report the results of applications of from 60 to 80 kg. of saltpeter per joch (from 93 to 124 lbs. per acre) to summer crops shortly before sowing and to winter wheat and rye the spring after sowing.

Good results were obtained with the top dressing, except in dry springs, and especially good results were obtained with the winter crop which had been fertilized with phosphorus and potash. Phosphoric acid in the fall followed by phosphoric acid and saltpeter in the spring showed a slightly higher yield.

Some data on work with buckwheat, L. ALTHAUSEN (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 6, pp. 801–824*).—The author reports the results of work begun in 1908 with red and white flowering strains of buckwheat. A close relation was found during the seasons of 1908–9 between the yield of grain and straw and the height of the plants.

Schabdar clover, L. TRABUT (*Bul. Agr. Algérie et Tunisie, 16 (1910), No. 18, pp. 434–436, figs. 2.*)—The author gives a brief account of tests of Schabdar clover (*Trifolium suaveolens*) grown from seed obtained from this Department. The tests seem to indicate that it is well adapted to the rotation of the country and is more resistant on the high plains than berseem (*Trifolium alexandrinum*).

Fermentation in the hay rick, B. N. WALE and H. C. L. KEABLE (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 52–55, figs. 2*).—Samples of clover hay were weighed at harvest time and later after remaining in hop pockets in the upper, middle, and lower portions of a rick. The average percentage of loss due to fermentation was 15.87. The results of a similar experiment with meadow hay have already been noted (E. S. R., 23, p. 236).

Corn secrets, P. G. HOLDEN (*Philadelphia, 1910, pp. 79, figs. 112*).—This is a manual of general information for the corn grower. It gives directions for the selection, preparation, and planting of seed and the cultivation of the crop, and suggests means of combating insect enemies. Experimental data already noted (E. S. R., 24, p. 33) are summarized and conclusions drawn from them.

Corn growing in Louisiana, V. L. ROY (*Univ. Bul. La. State Univ., n. ser., 11 (1911), No. 2, pp. 54, figs. 25*).—Studies of the corn plant and the status of corn growing in Louisiana and the South are accompanied by detailed directions for the production, harvesting, and storing of a corn crop.

The chemical composition of the different parts of the corn plant, I. WEISER (*Kisérlet. Közlem., 13 (1910), No. 6, pp. 734–748*).—The author reports the results of chemical analyses of the tassel, leaves, husks, the cob and kernels combined, and three divisions of the stalk.

Uniform distribution of the seed in planting compared with a varied distribution (*Queensland Agr. Jour., 25 (1910), No. 5, p. 213*).—Hogue Yellow Dent corn was planted in hills 3 ft. 8 in. apart each way during 1907–8. Each year 4 plats were planted with an average of 3 kernels per hill variously distributed. The uniform distribution gave slightly better results, but "ordinary variation in rate of dropping found in corn planters will have very little and probably no effect on the yield per acre."

Cotton-growing experiments in Mexico, C. A. MILLER (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 149, p. 1190*).—The consul reports that the first cotton crop grown in the vicinity of Columbus, Tamaulipas, yielded a bale or more per acre. The boll weevil caused no trouble but the army worm did some damage. The seed was imported from Georgia.

Cotton crop of Peru, C. A. MILLER (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 149, p. 1190*).—Estimates by the director of the Lima experimental station are reported on the production and exportation of cotton and cotton seed and its products during 1909–10. The cost of producing native cotton is placed at 2½ cts. per pound. Of the entire crop production, 65 per cent is American Upland, 32½ per cent Peruvian, and 2½ per cent Sea Island and Mitafifi.

Notes on hops, E. S. SALMON (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 337–359, pls. 4*).—Earlier work has already been noted (E. S. R., 23, p. 337). Tables present studies of the relation of the number of seeded and seedless bracteoles to the length of hop. The seeded hops excelled in length by from ¼ to ⅜ in., although the structure was the same. The increased length "would mean an increase of some 5 or 6 cwt. per acre," secured by planting male hops which flower at the same time as the general crop. The smaller hops contain an equal or greater number of bracteoles, the failure to grow out being due to absence of seed.

Seedless hops of the "Stirn" variety, similar in structure to the hop produced in the best districts of Germany, were grown in England, but their coarse flavor and poor cropping qualities indicated that they were useless to the English grower. The pollination of a plant of the Saaz (Bavarian) variety by Canterbury Whitebine produced fruit which retained some of the Bavarian flavor of the female parent. The average length of 50 hops was 1⅜ in., while 3 averaged nearly 2¾ in. and 75 bracteoles each.

One (12-burr) lateral springing from either side of the same vine was dusted with pollen and all were kept bagged. Practically all the burr had disappeared from the pollinated hops after 7 days, when the untreated laterals remained in full burr and showed some burr after 16 days.

Three tables present studies of the number of bracteoles, seeds, and length per hop in English and German varieties.

The hop garden (*Jour. Southeast. Agr. Col. Wye. 1909, No. 18, p. 81*).—The yield of 9 cwt. of fair quality hops per acre followed an application of 3 cwt. of superphosphate sown around the hills. The garden had been manured in the winter with 30 cwt. of wool waste and in the spring with 6 cwt. of fish guano per acre.

Trials with mangel seeds from large and small roots with and without selection, L. HELWEG (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 1, pp. 110–142, figs. 4*).—The results of trials conducted during the period 1906–1909 are presented and discussed in their practical bearings.

Factors influencing the yield of oats, F. H. DEMAREE (*Missouri Sta. Circ. 46, pp. 89–98*).—Discussions of the present status of oats and of the place of the crop in rotation, are followed by directions for its production.

In tests of 16 varieties conducted during 1905–1910 Siberian and Martinsburg produced the highest average yields of 40.18 and 39.83 bu. per acre, among the varieties tested 4 years or more. Red Rust Proof yielding 27.29 bu. per acre in 1908 when all other varieties were ruined by rust. A table states the characteristics of the varieties grown. In sowings of 8, 10, and 12 pk. per acre, it was found that "the weight per bushel and the yield of straw increases with the rate of seeding." The differences in grain yield were slight. Seed treated 10 minutes and 2 hours yielded 10.08 and 8.05 bu. more per acre, respectively, than the untreated seed.

Field trials with oat varieties, 1901–1908, K. HANSEN and M. L. MORTENSEN (*Tidsskr. Landbr. Planteavl, 16 (1909), No. 4, pp. 543–702*).—Five Danish plant culture stations conducted oat tests during 1901–1908. Detailed information is given as to these trials, and tables state the yield of grain and straw, the type of kernel, the percentage of hulls, and the chemical analyses of the different varieties tested. The varieties are described and their value discussed.

Tenth year's trials with root crops, L. HELWEG (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 2, pp. 238–270*).—Trials were conducted at the Danish plant culture stations with 23 different strains of Barres mangels, 14 of carrots, 5 of mangels, and 4 of ruta-bagas, giving results which are presented in tabular form.

The newer fertilizer tests with beet seedlings, L. SEMPOLOWSKI (*Bl. Zuckerrübenbau, 17 (1910), No. 5, pp. 85–88; abs. in Zentbl. Agr. Chem., 39 (1910), No. 12, pp. 860, 861*).—The author reports the results of experiments conducted to determine whether on the black soils of southwest Russia artificial fertilizers may be replaced by poultry manure, wood ashes, and similar materials. The entire field received an application of stable manure, and was divided into 10 plats. The fertilizer was applied under the plant.

The higher rates of fertilization produced the higher yields and profits within the limits of the test. The use of poultry manure was followed by higher yields than any other application except a mixture of 2 parts of superphosphate, 6 parts wood ashes, and 2 parts of Chile saltpeter. In net gain it greatly surpassed any other application tested.

The sugar beet industry in Nevada, C. S. Knight (*Nevada Sta. Bul. 75, pp. 9–38, figs. 18*).—A statement of the climatic and soil requirements of the sugar beet is followed by directions for producing the crop. Especial emphasis is laid on methods of irrigation and extended quotations are given from Farmers' Bulletin 392 (E. S. R., 23, p. 140). Tables give the analyses of beets grown at the station farm in 1910 and in other portions of the State during 1909 and 1910.

[Variety tests and analyses of sugar cane], L. G. Corrie (*Ann. Rpt. Queensland Acclim. Soc., 47 (1910), pp. 7–10*).—The conditions were unfavorable for high or even average sugar content in any cane, and the 17 highest results obtained from the society's seedlings ranged from 16.02 to 17 per cent of saccharose. The saccharose of 6 West Indian seedlings ranged from 17.32 to 20.26 per cent in 1907, and from 12.52 to 17.40 per cent in 1909. Each variety gave a lower yield in 1909 than in 1907. The standard variety, Rappoe, yielded 13.93 per cent.

The composition of wheat, J. W. Ames (*Ohio Sta. Bul. 221, pp. 37, pl. 1*).—This bulletin presents analyses of wheat crops grown on soils on which fertility tests have been conducted for 15 years, as previously noted (E. S. R., 20, p. 428), the wheat being grown under various climatic and soil conditions and methods of fertilization. A wide variation was noted in the phosphorus, potassium, and nitrogen contents of the wheat crop analyzed. On unfertilized plats of 2 soils differing as to these elements the composition varied in accordance with that of the soils. Their addition to the soil was followed by an increase in the proportion in which they occurred in the wheat plant. Variation due to seasonal conditions was greater than that resulting from changes in soil composition but those due to soil treatment were "relatively the same for the different seasons."

The addition of phosphorus to a soil deficient in this element increased the amount of phosphorus in the grain. The quantity of potassium was also increased but that of nitrogen decreased. Similar results followed the addition of lime. The use of barnyard manure increased the phosphorus content of the wheat plant to a greater extent than did acid phosphate, bone meal, dissolved bone black, or basic slag, and the use of untreated rock phosphate on a soil rich in nitrogen and potassium markedly increased the phosphorus content of the plant. The nitrogen content of the plant varied with the supply of this element and was also influenced by the supply of phosphorus. The potassium content of the straw varied with that of the soil on which it grew.

The improvement in the quality of wheat exported from the Central Provinces, G. Evans and A. E. Humphries (*Cent. Prov. [India], Agr. Dept. Bul. 4, 1910, pp. 14*).—The wheats grown in the Central Provinces are of two classes, Pissi or bread wheats and Gehun or macaroni wheats. This paper reports the results of tests of 4 bread wheats of which Raipuri Pissi was strongest but lowest in nitrogen content. Deshi Pissi was most lacking in strength but produced the highest yield, 740 lbs. per acre.

An examination of the seed supply of the Broach District, G. D. Mehta (*Dept. Agr. Bombay Bul. 37, 1910, pp. 18*).—Tables state the number of seed samples of each species examined and the percentages of purity, germination capacity, and useful seeds found.

Among other general conclusions from the studies, the author indicates that cotton-seed germination is poorer than that of the other seeds, perhaps because bought from local mills; that weevil attack is the greatest source of damage to the samples; and that the presence of hard seed in pulse crops sometimes necessitates a 50 per cent higher rate of sowing. Scratching the surface of such seed with a pin caused it to sprout within a day when placed under conditions otherwise suitable, and a practical machine for the purpose is needed.

[Seed tests and barley analyses], A. Voigt (*Jahrb. Hamburg. Wiss. Anst., 26 (1908), pp. 418–444*).—Brief descriptive notes state the more important observations made in the examination of different varieties of clover and grass seed, sources of oil and fiber, and by-products.

A report of the results of 12,605 analyses of barley, representing from 100 to 1,000 tons per sample, accompanies data showing that 94.4 per cent of the samples had purity percentages of 93 or higher. Parallel tests were made by different authorities interested, with an average difference of less than 0.523 per cent.

Tables show without comments the results of purity and germination tests of 20,085 seed samples received from 527 sources in 11 European countries.

Report of the seed control station in Lund, 1909, A. Vilke (*Frökontrollanst. Lund Verks. 1909, pp. 39*).—Tables and a descriptive text state the results of mechanical analyses of seeds of grasses, legumes, and fiber and other crops. Statistical studies show the frequency of occurrence of the principal weed seeds in seeds of each of the economic varieties analyzed.

The destruction of weeds by chemical means, H. C. Long (*Sci. Amer. Sup., 71 (1911), Nos. 1831, pp. 76, 77; 1832, pp. 93, 94, figs. 14*).—General discussions of the prevalence, injury, and cooperative destruction of weeds, are followed by a review of work on the destruction of weeds by spraying already noted from various sources. Citations are given to the publications from which the data has been compiled.

Killing weeds with arsenite of soda, E. V. Wilcox (*Hawaii Sta. Press Bul. 30, pp. 15*).—The author reviews previous work on the use of chemicals for weed destruction and reports studies with a stock solution obtained by boiling together about 2 lbs. sal soda to 1 lb. white arsenic per gallon of water, and diluting with from 15 to 20 parts of water. This solution was used on oi (*Stachytarpheta dichotoma*), lantana, spurge (*Euphorbia peplus*), sow thistle, pig-weed, purslane, cockle-burr (*Xanthium strumarium*), glue (*Acacia farnesiana*), dodder, Japanese nut-grass, honohono (*Commelina nudiflora*), crotalaria, and other weeds.

A single application ultimately killed the leaves and stems of all. The effect was usually manifest in 2 or 3 hours but the leaves of the Japanese nut-grass did not turn brown until the second day. The mixture killed alfalfa as well as the dodder with which it was infested. The Hitchcock berry, German ivy, and the nettle (*Hesperocnide sandwichensis*) were also destroyed by its use.

The author suggests the application of 100 gal. per acre of the diluted mixture. By the use of a 5 gal. knapsack spray, a laborer can spray from 1 to 2 acres per day.

The possibility of danger from the use of arsenite of soda is discussed, with special reference to Hawaiian conditions.

HORTICULTURE.

Experiments in frost protection, A. G. McAdie (*Mo. Weather Rev., 38 (1910), No. 12, pp. 1894, 1895, figs. 2*).—This article briefly reports experiments which indicate that the efficiency of methods of frost protection by means of fire pots or similar appliances may be greatly increased by the use of some sort of cover device, and describes a cover suitable for the protection of deciduous fruit trees, and with some modification, for use with vines, garden truck, flowers, and similar crops.

"The cover consists of a reasonably cheap and light-weight material, yet sufficiently tough to withstand out-of-door exposure, and is rainproof. It is essentially a paper cover, and the principle, indeed, is the same as used by many housekeepers and gardeners to protect favorite plants, namely, by covering them with newspapers or cloths. . . . The material can be made in double sheets with an intervening air space, which gives a very high degree of protection. For ordinary use a single layer will suffice. . . . The covers can be made in any size. There is a small central frame of wood, cross braced, to which the paper is tacked. From the central frame flaps of the cloth paper extend, and there are suitable lacing strings provided to bring the ends of the flaps together and also to fasten the cover edges to the tree trunk, so that the cover remains in place should wind arise during the night hours."

Garden management, A. G. B. Bouquet (*Oregon Sta. Circ. 11, pp. 8, figs. 3*).—This discusses in a popular way some of the important points in the management of a vegetable garden. The phases considered are seeds, soil preparation, arrangement of crops, seed sowing, thinning, fertilization, and transplanting.

Garden profits, E. L. D. Seymour (*Garden City, N. Y., 1911, pp. 245, figs. 58*).—A popular treatise on vegetable growing, including the management of cold frames and hotbeds, designed primarily for back yard and suburban gardens. In addition to general and specific cultural directions, the records of a number of small, successful gardens are given, together with a working calendar for the year, and chapters on fertilizers, plant diseases and insect pests and their control.

Fertilizers on asparagus, C. P. Close, T. H. White, and W. R. Ballard (*Maryland Sta. Bul. 151, pp. 135–146, figs. 2*).—A fertilizer experiment with asparagus, planned by H. J. Patterson and W. N. Hutt and conducted continuously from 1905 to 1910 inclusive, is reported. Concise directions are given for starting and caring for an asparagus bed. The experimental bed was started with 1-year-old plants in 1903 on medium loam of good fertility. Comparisons and tests were made of commercial fertilizer versus barnyard manure, different sources of potash, light and heavy applications of kainit, heavy applications of nitrate of soda in spring, heavy applications of salt, manure in different amounts with and without commercial fertilizer, and different times of applying manures and fertilizers. The various treatments, including the results as indicated by the yields and costs of the different treatments, are tabulated and discussed.

Cabbage, L. C. Corbett (*U. S. Dept. Agr., Farmers' Bul. 433, pp. 23, figs. 11*).—This bulletin contains detailed directions for the culture of cabbage as a truck crop, market-garden crop, and farm crop, including information relative to the soil, fertilizers, starting and transplanting, cultivation, control of insects and diseases, harvesting, varieties, marketing, and storage.

Observations on screening cabbage seed beds, W. J. Schoene (*New York State Sta. Bul. 334, pp. 13–34, pls. 2, chart 1*).—The observations here recorded were made in order to determine the cost of screening and to show what cabbage growers have accomplished in protecting their seedlings in the manner recommended in Bulletin 301, previously noted (E. S. R., 20, p. 59).

The 2 principal seed bed pests thus dealt with, namely, the turnip flea beetle (*Phyllotreta vittata*) and the cabbage maggot (*Pegomya* sp.) are briefly considered. The relation of the usual time for growing late cabbage seedlings to dates of appearance of insects in various stages is illustrated by a chart which shows that in the region considered the period of growth of the plant coincides with the period during which oviposition occurs and the first brood of maggots develop.

The experience of farmers during the past 4 years has shown conclusively that the use of tight frames covered with cheese cloth will entirely prevent injury by the cabbage maggot and that the use of certain grades of cheese cloth will help to prevent injury by the flea beetle. Cloth having from 20 to 30 threads to the inch is to be preferred for the purpose of protecting cabbage seedlings. The extra cost of screening plants in 11 seed beds of 10 different growers was found to range from 6 to 20 cts. per 1,000 plants.

It is stated that plants grown under screens have good roots so that they start quickly when transplanted, while plants grown in the open are liable to suffer a varying amount of root injury even in years when there is only a mild infestation of maggots. "The screened plants are more tender than those not screened, but experience has shown that by removing the cover a week or 10 days before transplanting, the seedlings become sufficiently hardened so that there is very little difference in the growth of the sets in the field."

Screening seed beds controls cabbage maggots, F. H. Hall (*New York State Sta. Bul. 334, popular ed., pp. 6, figs. 3*).—A popular edition of the above.

The home production of onion seed and sets, W. R. Beattie (*U. S. Dept. Agr., Farmers' Bul. 434, pp. 24, figs. 12*).—In a previous Farmers' Bulletin the culture of onions for the general market was discussed (E. S. R., 21, p. 139). The author here treats in detail of the special methods of culture for the production of onion seed and sets. He points out that whereas both onion seed and sets may be readily grown as a side issue with other lines of farming, there is no large profit to be obtained from the sale of either seed or sets and that the greater profits are obtainable from comparatively small plantings.

Fruit farming in West Kent, C. H. Hooper (*Jour. Bd. Agr. [London], 17 (1911), No. 10, pp. 811–815*).—A brief general account of the management of fruit orchards in West Kent, giving some data relative to the cost of establishing orchards.

Planting the commercial orchard, J. G. Moore (*Wisconsin Sta. Bul. 201, pp. 3–34, figs. 15*).—A bulletin taking up in a popular way apple culture with special reference to Wisconsin conditions. General consideration is given to the possibilities of orcharding in Wisconsin and the apple-growing sections of the State. The important cultural phases discussed include the selection of site and soil, the details of planning and planting the orchard, selecting trees for planting including pointers in ordering nursery stock, planting time and distances, top pruning young trees, and varieties for Wisconsin.

Orchard practice, W. J. Green (*Ohio Sta. Circ. 108, pp. 8*).—This consists of a concise popular discussion of orchard practice. Consideration is given to the details of starting an apple orchard, including a list of varieties suitable for southern and northern Ohio, training, pruning, spraying, thinning, and orchard rejuvenation.

Combating diseases and insects of the orchard, W. H. Chandler (*Ann. Rpt. Mo. Bd. Hort., 3 (1909), pp. 346–391, pls. 21*).—A brief popular account of the insect enemies and diseases of the orchard and methods of combating them.

Orchard spraying suggestions for 1911, W. J. Green, A. D. Selby, and H. A. Gossard (*Ohio Sta. Circ. 109, pp. 3*).—This circular contains advice supplemental to that in Bulletin 199 previously noted (E. S. R., 20, p. 1055).

Orchard sprays and spraying, A. B. CORDLEY and H. S. JACKSON (*Oregon Sta. Circ. 13, pp. 3–16*).—Directions are given for the preparation and application of insecticides and fungicides in combating the insect enemies and fungus diseases of the apple, pear, peach, plum, prune, and cherry.

Report on inspection of orchard irrigation plants, E. KRÜGER (*Deut. Obstbau Ztg., 1911, No. 8, pp. 129–134, figs. 7*).—The irrigation of a number of orchards in Germany is described.

Breeding ever-bearing strawberries, C. F. GARDNER (*Nat. Hort., 3 (1911), No. 6, pp. 9, 10*).—A short account of the author's work in breeding ever-bearing strawberries. One variety particularly which gives promise of bearing continuously from June to November is being further developed.

On the use of insecticides in viticulture, L. MOREAU and E. VINET (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 23, pp. 1068–1070*).—Experiments made at the Angers enological station to determine the amount of lead arsenate retained by grapes when applied for the first and second generations of the cochylis moth are here reported. See also a previous note (E. S. R., 24, p. 168).

The use of lead arsenate in viticulture and the consumption of table grapes and raisins, L. MOREAU and E. VINET (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 24, pp. 1147, 1148*).—A continuation of the investigations above noted, in which the authors report the results of analyses made of the berries and stems of grapes sprayed twice prior to blooming (May 31 and June 14) with arsenate of lead, and also of those to which a third application was made (August 6) after blooming.

In analyses made August 6 of the grapes that had received 2 applications, 0.86 mg. of arsenate of lead to 100 gm. weight was found in the berries and 4.86 mg. in the stems; none was found in the berries and but 0.02 mg. in the stems of grapes harvested October 15. In analyses made August 6, directly following the third application, 10.60 mg. of arsenate of lead to 100 gm. weight was found in the berries and 28.33 mg. in the stems; 0.40 mg. was found in the berries in collections made at the time of vintage on October 27 and 5.51 mg. in the stems.

The amount of arsenic in Algerian grapes, P. FETEL (*Bul. Agr. Algérie et Tunisie, 16 (1910), No. 18, pp. 430–434*).—With a view to providing data regarding the use of arsenic sprays, grapes were analyzed for the presence of this element and in the neighborhood of 0.5 mg. per kilogram of fruit was found.

The banana and its culture in Jamaica, H. H. COUSINS (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1911), No. 4, pp. 217–235, pls. 3*).—This paper supersedes Fawcett's paper on the banana industry in Jamaica (E. S. R., 14, p. 442) now out of print.

Consideration is given to the botany, anatomy, and varieties of the banana, banana soils, including physical and chemical analyses of various soil types, cultivation and preparation of land, planting and planting distances, irrigation and drainage, cultivation after planting, treatment of suckers, pruning leaves, harvesting, replanting, and data on the cost of cultivation, receipts, areas under bananas, and exports.

Popular garden flowers, W. P. WRIGHT (*London, 1911, pp. XI+376, pls. 54*).—In the present work the author deals with the most important garden flowers, relative to their history, the origin and pronunciation of their names, their position in literature and folklore, value as modern garden plants, and culture, and the best varieties. With such plants as carnations, chrysanthemums, and roses, a summary of cultural operations in the form of a monthly calendar is given.

The book of roses, L. DURAND (*London and New York, 1911, pp. VII+101, pls. 16*).—A popular work containing general directions for propagating and growing roses, together with specific information relative to the culture of roses of various types. Chapters are also included on exhibiting roses and the enemies of the rose. A list of good roses for garden cultivation is appended.

Injuries to the rose by animals, M. Schwartz (*In Rosenkrankheiten und Rosenfeinde. Jena, 1910, pp. 35–59*).—Some 50 species of animals are briefly described and tabulated according to the parts of the plant that they injure. Remedial measures are briefly noted.

Cut-flower industry in southern France, F. M. Mansfield (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 87, pp. 193–200, fig. 1*).—An account of the cut-flower industry of southern France, with special reference to methods of preparing the flowers for market and facilities for expeditious and economical distribution of the product.

FORESTRY.

Familiar trees and their leaves, F. S. Mathews (*New York and London, 1911, 3. ed., pp. XVII+334, pls. 15, figs. 221*).—This is the second revised edition of this work (E. S. R., 8, p. 135). The revision largely relates to the scientific nomenclature, which follows the initiative of the seventh edition of Gray's Manual, revised by B. L. Robinson and M. L. Fernald (E. S. R., 20, p. 326).

The supplement contains an addition of some 20 species new to the book, together with a systematic index of the names of trees of the eastern United States, including the botanical names according to A. Gray and C. S. Sargent.

The hardy catalpa in Iowa, C. A. Scott (*Iowa Sta. Bul. 120, pp. 309–325, figs. 5*).—This bulletin contains directions for establishing and caring for plantations of hardy catalpa (*Catalpa speciosa*), discussing the range of successful growth, form and size, selection of species, propagation from seeds, planting stock, soil requirements, preparation of planting site, time of planting, spacing, cultivation and care of plantation, protection against rabbits, cutting back, fungus diseases, length of rotation, second crop, time of cutting, seasoning, and durability of catalpa wood.

Nearly all the hardy catalpa plantations in the State have been studied by the forestry section of the station. A large majority of these plantations have proved successful, and the results obtained on some of them are given. The gross annual return per acre on the plantations studied varied from $10.77 to $20.34. Eighteen-year-old trees that have been properly cared for will yield from 2,000 to 2,500 posts to the acre.

The hardy catalpa is of special importance in Iowa for the production of fence posts. The annual destruction of the late growing terminal shoots at the approach of winter, coupled with the liability of older trees to fungus attacks, results in very crooked and, generally, diseased poles. Hardy catalpa posts which have not become infected by fungi before cutting and which are properly seasoned rank next to Osage orange and red cedar in durability. They season best if cut in November or December, but if a second crop is desired from sprout reproduction, the first cutting should be made in February or March. The most common cause of failure with catalpas is attributed to the substitution of the common catalpa (*Catalpa catalpa*), which is not hardy enough for Iowa. It can be distinguished from the hardy species by differences in the bark and seeds.

The oak: Its natural history, antiquity, and folklore, C. Moseley (*London, 1910, pp. IX+126, pls. 8*).—This popular work deals largely with the history of the oak in the British Isles.

Some notes on jack pine (Pinus divaricata) in western Ontario, L. M. Ellis (*Forestry Quart., 9* (*1911*), *No. 1, pp. 1–14, pl. 1*).—These notes, which are based largely on the author's field investigations, discuss distribution and association, habitat, characteristics, silvicultural requirements, and rate of growth of jack pine. Tabular data showing composition of type stands, taper of logs on different grades of soil, height, diameter, and volume measurements, including rate of growth and yield of ties under average soil conditions, are also given.

The rubber plants of western and southern Madagascar, H. JUMELLE and H. PERRIER (*Agr. Prat. Pays Chauds, 11* (*1911*), *No. 96, pp. 177–193*).—An account of the rubber plants in western and southern Madagascar with special reference to their geographic distribution and exploitation. Most of the plants noted have been previously described (E. S. R., 24, p. 245).

The rubber country of the Amazon, H. C. PEARSON (*New York, 1911, pp. X+228, pl. 1, figs. 175, maps 5*).—A detailed description of the great rubber industry of the Amazon Valley, which comprises the Brazilian States of Pará, Amazonas, and Matto Grosso, the Territory of the Acre, the Montaña of Peru and Bolivia, and the southern portions of Colombia and Venezuela.

Fixation of the dunes on the coast of Jutland, W. J. MORRILL (*Forestry Quart., 9* (*1911*), *No. 1, pp. 62–67*).—A description of the methods employed in Denmark to stop the shifting of sands, the subject matter being adapted from an article by J. Givskov.

Grain and texture in wood, S. J. RECORD (*Forestry Quart., 9* (*1911*), *No. 1, pp. 22–25*).—A discussion of the terms "grain" and "texture" in relation to their use in forestry.

Strength of ties treated with crude oil (*Engin. Rec., 63* (*1911*), *No. 12, p. 335*).—Results are given and discussed of a test conducted by W. K. Hatt of Purdue University to determine the effect of crude-oil treatment on the strength of loblolly pine, shortleaf pine, and red gum, ties. The spike-holding power of the ties appears to be materially decreased by the crude oil treatment.

The lumber production of the United States, R. S. KELLOGG (*Rpt. Nat. Lumber Manfr. Assoc., 8* (*1910*), *pp. 95–108, dgms. 2*).—A statistical review based largely on reports of the United States Bureau of the Census and the Forest Service of this Department.

The problem of private forestry, H. S. GRAVES (*Rpt. Nat. Lumber Manfr. Assoc., 8* (*1910*), *pp. 81–93*).—A discussion of this subject with special reference to the development of forest management on lands owned by lumbermen.

Forest protection, C. A. SCHENCK (*Asheville, N. C., 1909, pp. 159*).—This is a guide to lectures on forest protection delivered at the Biltmore Forest School. The material is presented under the general headings of protection against organic and inorganic nature. Under the former heading are discussed protection against man, animals, and plants, and under the latter heading consideration is given to adverse climatic influences, storms, erosion, sand drifts, and noxious gases.

Purchase of land under the Weeks law in the southern Appalachian and White Mountains (*U. S. Dept. Agr., Forest Serv.* [*Pamphlet*], *1911, pp. 9*).—The purposes and text are given of the recent federal law authorizing the purchase of lands for preserving the watersheds and conserving the navigability of streams (E. S. R., 23, p. 498). The classes of land desired and the procedure in making selections and purchase, as well as the areas within which proposals for sale are at present invited, are indicated.

Some facts on forestry conditions in Sweden, C. METZGER, trans. by M. H. FOERSTER (*Forestry Quart., 9* (*1911*), *No. 1, pp. 45–58*).—A translation of the author's article, previously noted (E. S. R., 23, p. 147).

The Swedish forest conservation law, B. E. FERNOW (*Forestry Quart., 9* (*1911*), *No. 1, pp. 59–61*).—A brief review of the work of the county conservation boards, organized in Sweden under the above-named law in 1905, in connection with the policy of influencing private forest management.

Report on Cyprus forestry, D. E. Hutchins (*London, 1909, pp. 93, pls. 20, map 1*).—This report includes a descriptive account of the forests of Cyprus and describes the progress made in forest management, methods of exploitation, forest produce, and similar matters.

Progress report on forest administration in the Punjab for 1909–10, C. P. Fisher (*Rpt. Forest Admin. Punjab, 1909–10, pp. 21+LI*).—This is the usual report relative to the constitution and management of the state forests in the Punjab, including a financial statement for the year. The more important data relative to areas, forest operations, exploitation, yields, revenues, expenditures, etc., are appended in tabular form.

Report on the forests and forestry problems in Sierra Leone, A. H. Unwin, (*London, 1909, pp. 54, pls. 21*).—In addition to a general description of the principal forests in Sierra Leone, notes are given on the species of trees found there, the present condition of the forest, forest products, and exploitation, with suggestions relative to future management. A report on the proposed forest reserves for the Imperial War Department is also included. Tabular data are given listing the indigenous trees in the Colony and Protectorate of Sierra Leone, timbers used by the War Department, imports and exports of forest produce, proposed timber fees and girth limits, and estimates of revenues and expenditures.

The equipment and operation of a German seed-extracting establishment, F. Wiebecke, trans. by S. L. Moore (*Forestry Quart., 9 (1911), No. 1, pp. 26–44*).—A translation of the greater part of an article by the author, describing the operation of a seed-extracting establishment (E. S. R., 23, p. 445).

A bibliography of forest literature for the year 1910 (*Skogsvårdsför. Tidskr., 1911, Fackafd., No. 3, pp. 148–164*).—A bibliography is given of the important European and American literature on forestry and allied subjects issued during 1910.

DISEASES OF PLANTS.

Cultures of some heterœcious rusts, W. P. Fraser (*Mycologia, 3 (1911), No. 2, pp. 67–74*).—Successful cultures are reported as follows: Teleutospores of *Melampsoropsis cassandræ* from *Chamædaphne calyculata* produced æcidia of *Peridermium consimile* on *Picea rubra;* teleutospores of *M. abietina* from *Ledum grœnlandicum* produced æcidia of *Peridermium abietinum* on *Picea rubra;* teleutospores of *M. ledicola* from *Ledum* sp. produced æcidia of *Peridermium decolorans* on *Picea canadensis;* teleutospores of *Uromyces peckianus* from *Distichlis spicata* produced æcidia on *Atriplex patula hastata* and *Chenopodium album.*

In addition to the cultures noted, the alternate stages of these rusts were found constantly associated on their corresponding hosts in the open fields and woods. Also, *M. pyrolæ* was found associated with *Peridermium conorum-piceæ,* the uredo and teleutospore stages on *Pyrola americana* and *P. elliptica,* and the æcidial stage on the young pistillate cones of *Picea mariana.* The æcidial stage of *Calyptospora columnaris* is reported as common on young plants of *Abies balsamea.*

On some parasitic Plasmodiophoraceæ, R. Maire and A. Tison (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 4, pp. 206–208*).—The authors propose and describe a new genus, Ligniera, and two new species, *L. radicalis* and *L. verrucosa,* for that group of the parasitic Plasmodiophoraceæ which do not produce hypertrophy of the affected tissues of the host.

Sorosphæra junci is also transferred to this new genus as *L. junci.*

Take-all (Ophiobolus graminis), G. L. SUTTON (*Agr. Gaz. N. S. Wales, 22 (1911), No. 2, pp. 161–163*).—The characteristics of this disease, its prevalence, and the damage done by it, together with suggestions as to its control, are given. See also a previous note (E. S. R., 24, p. 551).

The relation of crown gall to legume inoculation, K. F. KELLERMAN (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 76, pp. 6, pl. 1*).—Attention is called to the presence on the roots of alfalfa, crimson clover, and alsike clover of tumors somewhat resembling normal nitrogen-fixing nodules, but in reality galls of the crown-gall organism (*Bacterium tumefaciens*). The differences, which are here described, between these tumors and nitrogen-fixing nodules are sufficiently typical to be easily recognized by an experienced observer, both by their external appearance and by the use of special culture media. The author advises that great care should be taken in using soil or cultures for inoculating legumes in regions which may eventually be used for sugar beets or for orchards.

A foot rot of asparagus, R. FARNETI (*Riv. Patol. Veg., 4 (1910), No. 18, pp. 273–277*).—Attention is called to a serious disease of asparagus in Liguria, which causes a rotting of the younger shoots at their point of attachment to the rhizome, resulting finally in their death and separation from the rhizome. An examination of the roots of diseased plants showed the presence of black, globular perithecia, which belong to *Zopfia rhizophila* (Perisporiaceæ).

The destruction of all diseased plants by burning, and the disinfection of the asparagus beds with carbon bisulphid, are recommended.

Wilt disease of cotton in Georgia and its control; cotton anthracnose, A. C. LEWIS (*Ga. Bd. Ent. Bul. 34, 1911, pp. 31, pls. 4, figs. 10*).—The author gives notes on the history, distribution, annual losses, symptoms, and cause of cotton wilt (*Neocosmospora vasinfecta*), together with a report on experiments from 1905 to 1910 with different fertilizers, fungicides, and resistant varieties of cotton in combating the wilt. The fertilizers and fungicides proved to be of no value in controlling the disease, but by planting wilt-resistant varieties of cotton, together with a proper crop rotation, good yields were secured and very little of the cotton died from the wilt. The varieties of cotton recommended as wilt-resistant are Dillon, Dixie, Modella, Grant, and an unnamed hybrid. For crop rotation, corn, oats, wheat, rye, Iron cowpea, velvet bean, and peanuts are suggested, as these crops are resistant to both the fungus and nematode.

A discussion is also presented of the symptoms and cause of cotton anthracnose, and the author gives the results of tests as to the resistance to this disease of various varieties of cotton. The disease is said to be carried over in the seed, and since at present no practical method is known of treating the seed to kill the fungus spores, rotation of crops and the planting of varieties which are more or less resistant to the disease, such as Sistrunk, Schley, and Modella, are advised.

Wart disease of the potato, W. CUTHBERTSON (*Gard. Chron., 3. ser., 49 (1911), No. 1261, pp. 122, 123*).—Attention is called to the fact that all varieties of the Up-to-date type, which are the most resistant to the late blight (*Phytophthora infestans*), are the most susceptible to the wart disease (*Synchitrium endobioticum*), while some varieties of the Abundance type which succumb quickest to the late blight are resistant to the wart disease. Varieties of the Langworthy type are resistant to both diseases.

These observations are based on the results of tests with different varieties of potatoes resistant to the wart disease as reported in a recent bulletin from the Harper-Adams Agricultural College (E. S. R., 24, p. 449).

The rotting of root crops during the winter of 1908–9, F. K. RAVN (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 1, pp. 143–162, figs. 4*).—The author presents a study of the causes of a general rotting of root crops (mangels and ruta-bagas) on Danish farms during the winter of 1908–9.

Fungus diseases of the apple, Edna F. McCormack (*Ann. Rpt. State Ent. Ind., 3 (1909–10), pp. 128–165, figs. 29*).—The author describes the symptoms of the common diseases of the apple in Indiana, and gives the measures to be used in combating them.

Observations on the susceptibility of different kinds of cherries to the Botrytis fungus (Sclerotinia cinerea), G. Köck (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 11, pp. 889, 890*).—It is claimed that the apparent immunity of certain varieties of cherries to the attack of this fungus is due to the fact that their time of blossoming for a given locality does not coincide with the weather conditions favorable for the propagation of this disease, while other varieties which are apparently susceptible have their blooming period coincident with the weather conditions suitable for infection by the Botrytis rot (*S. cinerea*), and therefore are often severely attacked by the fungus.

Contribution to the biology of the grape mildew, J. Laurent (*Rev. Sci. [Paris], 49 (1911), I, No. 9, pp. 267–272*).—The author discusses the variation in virulence of the mildew and the relative susceptibility and immunity of certain varieties of the grape to the disease. Attention is again called to the results of experiments (E. S. R., 24, p. 650) in which the degree of sap concentration seems to indicate the immunity to the disease which a given variety of grapes may possess, the higher the molecular concentration the greater being the resistance.

[Decree concerning the exportation of diseased fruit trees from Holland] (*Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), No. 1, pp. 39–44*).—The text is given of a decree issued in Holland in 1909 concerning the inspection of all fruit trees offered for export. A certificate is required showing the nature of the shipment, where grown, the point of distribution, and a statement from the state entomologist and phytopathologist of Holland that the plants have been inspected and found free from the San José scale, peach yellows, rosette, or other pests liable to dissemination on nursery stock.

Brown root disease, T. Petch (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1910), No. 6, pp. 47–54, pls. 3*).—The symptoms, cause, and methods of infection of this disease are given. It attacks many kinds of plants, such as Hevea, cacao, tea, dadap, Castilla, Caravonica cotton, camphor, and *Brunfelsia americana*, and is characterized by an encrustation of the roots, especially the tap root, with a mass of sand, earth, and small stones to a thickness of 3 to 4 mm.; this crust, as a rule, extends up the stem for several inches.

Recently the fungus concerned has been certainly identified as *Hymenochæte noxia* by its fructifications, which form a thin, dark brown crust on the base of the stems. As the fructifications of this fungus appear only on stems or stumps dead for a long time, the spread of the disease from one living plant to the next is due to the mycelium spreading from root to root of adjacent plants where the roots are in contact.

In Ceylon the disease attacks cacao and spreads from it to the Hevea trees which have been interplanted with cacao. The remedial treatment consists of the removal and burning of the dead trees and their roots, and in case of young Hevea planted on old cacao land all cacao stumps should be dug out at once.

A similar jungle disease attributed to *H. rigidula* and found on several species of trees is also discussed, and the peculiar, honeycomb-like character of the diseased wood is figured.

The Glœosporium rot of bananas and a Phyllosticta leaf spot of ivy, R. Laubert (*Gartenflora, 59 (1910), No. 19, pp. 409–415, pl. 1, figs. 2*).—Attention is called to a rot of bananas very common on the fruit offered for sale in the markets. This is probably due to *G. musarum*, a fungus closely related to *G. fructigenum*, the cause of bitter rot of apples.

A description is given of a leaf spot of ivy produced by *P. hedericola*.

Cacao and Hevea canker, T. Petch (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1910), No. 13, pp. 143–180*).—After a general discussion of the literature bearing on the cacao pod rot and canker, the author gives the results of inoculation experiments with the cacao Phytophthora on the pods and stems of cacao and Hevea. A description of the fungus (*P. faberi*), symptoms of the disease on cacao and Hevea, and methods of treatment are also given.

Both stem canker and pod rot were produced by introducing Phytophthora cultures into the pods and stems of cacao and Hevea, while inoculations with various species of Nectria on both cacao and Hevea gave negative results. The author, therefore, concludes that stem canker and fruit rot of both cacao and Hevea are due to the same organism, *P. faberi*.

The treatment of cacao canker and pod disease comes under 4 heads, viz, excision of diseased tissues, collection of diseased pods, removal of shade and spraying. The location and character of the disease, whether on the stems or pods, determine which of these remedies should be used, as well as the type of the plantation, whether heavily shaded or interplanted with Hevea. The results of various spraying experiments are given, but the cost in most cases seemed prohibitive compared to the results obtained.

A root disease of Hevea, T. Petch (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1910), No. 8, pp. 65–71, pls. 2*).—A description is given of the root disease of Hevea due to *Sphærostilbe repens*, while sources of infection and methods of treatment are also discussed.

The fungus develops freely on pieces of jak wood and on decaying jak stumps; these should, therefore, be kept out of Hevea plantations. Dead Hevea trees should be dug up with as much of the roots as possible and burned. Any neighboring stumps, especially jak stumps, and all pieces of woods and roots should also be burned; and since the disease can be spread by rhizomorphs through the soil to adjacent trees, the affected area should be isolated by trenches about 1 ft. deep, and the inclosed ground should be dug up and treated with quicklime.

Pink disease of Para rubber and Bordeaux mixture, R. D. Anstead (*Planters' Chron., 6 (1911), No. 8, pp. 98–101*).—In the experiments reported, over 200,000 trees were treated for pink disease (*Corticium javanicum*) with a 6:4:45 Bordeaux mixture to which some type of sticker had been added. The mixture was applied with a brush to the trunk, special attention being given to the forks and whorls of branches, where it was well rubbed in.

The best time for the first application was found to be during May and June, while a second application seemed to be unnecessary. On one plantation the treated area showed only 0.56 per cent of the disease, or less than 1 tree per acre, while the untreated trees gave 1.34 per cent, or 2 diseased trees per acre. Practically similar results were obtained on the other plantations. It is stated that if every tree is properly treated with this mixture, there will be no cases of the disease.

The copper blight of tea, F. J. F. Shaw (*Agr. Jour. India, 6 (1911), No. 1, pp. 78, 79*).—The symptoms of this disease, which is attributed to *Læstadia theæ*, are described, and its probable identity with a similar blight previously reported from Assam is suggested.

The fungus, which was found on dried leaves from Dooars, produces small, irregular, copper-colored spots on the upper surface of the leaves. Later, the discoloration extends entirely through the leaf, appearing on the under surface as a yellowish brown patch, while the upper surface is now of a grayish color. During the earlier stages the diseased areas are covered with minute black spots, due to the presence of pycnidia situated just below the epidermis of the leaf. The blight spreads with extreme rapidity and attacks only the older leaves.

Plucking and burning the diseased leaves and spraying with Bordeaux mixture are suggested as possible remedies.

Root diseases of tea, T. PETCH (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1910), No. 11, pp. 95–114, pls. 2*).—Five root diseases of tea have been investigated, and are here listed in order of prevalence: *Ustulina zonata*, *Hymenochæte noxia*, *Poria hypolaterita*, *Botryodiplodia theobromæ*, and *Rosellinia bothrina*. The distinguishing marks and symptoms of each disease are given, and methods of treatment suggested.

Root diseases of Acacia decurrens, T. PETCH (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1910), No. 10, pp. 89–94, pls. 3*).—The author describes two root diseases of this tree. One, due to *Armillaria fuscipes*, causes the death of trees 15 months old or over which are used as windbreaks in tea plantations, but the fungus apparently does not attack the tea; the other, *Fomes australis*, a common jungle fungus, attacks old trees of *A. decurrens*, at Hakgala, slowly and gradually killing them.

Uprooting and burning the diseased trees is suggested as a probable remedy for checking further dissemination.

The spruce scab (Lophodermium macrosporum), E. MER (*Bul. Soc. Sci. Nancy, 3. ser., 11 (1910), No. 1, pp. 1–59*).—The first and major portion of this paper is a reprint of a previous article on this subject (E. S. R., 24, p. 453) by the same author, while the second and concluding part discusses the damage done by this fungus and suggests preventive and curative measures (E. S. R., 24, p. 251).

Some new parasitic fungi of ornamental plants, G. TRINCHIERI (*Bul. Orto Bot. R. Univ. Napoli, 2 (1910), No. 4, pp. 495–504*).—In addition to 4 species previously noted (E. S. R., 23, p. 355) the author describes as new *Macrophoma dyckiæ* on the scapes of *Dyckia sulphurea*, *Ascochyta haworthiæ* on the scapes of *Haworthia tortuosa*, and *Chætomella gasteriæ* on the scapes of *Gasteria fuscopunctata*.

Spray injury induced by lime-sulphur preparations, E. WALLACE (*New York Cornell Sta. Bul. 288, pp. 105–137, pls. 4*).—This bulletin gives the results of experiments with lime-sulphur mixtures, arsenical preparations, and combinations of the two on fruit and foliage injury to fruit trees, especially apples and peaches.

It was found that the method of application is a very important factor, as overdrenching of the trees seemed likely to cause burning of the foliage. Arsenite of lime, arsenite of soda, or Paris green is likely to cause serious foliage injury, while arsenate of lead decreased to some extent the caustic properties of lime-sulphur sprays and seemed to be the only arsenical that could be used with the lime sulphur on apple foliage. However, lime-sulphur and arsenate of lead mixture when applied with a gas sprayer may produce some injury to apple foliage, and certainly caused serious defoliation of peach trees in the tests made.

The addition of lime or the retention of the sediment of the lime-sulphur solution affected very little the amount of foliage injury. Precipitation of lime-sulphur solution alone by the carbon dioxid of the gas sprayer prevented any caustic action on peach foliage, even at a strength of 1:30, and with no apparent diminution of its fungicidal properties. Infection of apple leaves with the scab fungus previous to the application of the spray was one of the most common causes of spray injury, by admitting the spray material to the interior tissues of the leaf.

Varietal susceptibility seems important, at least with pears, as Duchess was more susceptible to foliage injury than any of the other varieties. A commercial brand of arsenate of lead used alone caused foliage injury to appear sooner on peaches than when used in combination with lime sulphur 1:150. The russeting of apples from lime-sulphur sprays is very rare and of minor importance.

The injurious action of lime sulphur is claimed to be fundamentally different from that of Bordeaux mixture. The Bordeaux mixture injury usually does not occur at once, but appears under certain atmospheric conditions, while the lime-sulphur injury is initiated before the solution dries on the trees.

Lime sulphur as a summer spray, E. WALLACE (*New York Cornell Sta. Bul. 289, pp. 141–162, figs. 9*).—The general results are given of investigations of lime sulphur as a summer spray, conducted during 1909–10 by the author as a fellow on the Niagara Sprayer Company Fellowship in the Department of Plant Pathology of Cornell University (E. S. R., 22, pp. 650, 652).

It is claimed as a result of these experiments, which extended throughout both a dry and a wet season, that lime-sulphur solution properly used in combination with lead arsenate is as effective in controlling apple scab as Bordeaux mixture. Home-boiled and commercial preparations of lime sulphur diluted 1:30 and 1:40 combined with lead arsenate, and Bordeaux mixture 3:3:50 with lead arsenate, were found about equally effective in controlling the scab. It is claimed that the addition of lead arsenate to the lime-sulphur sprays increased the fungicidal value of the lime-sulphur mixture about 50 per cent.

According to the laboratory tests, sediment from heavy grade Niagara lime sulphur with a 2:30 dilution proved to have about half as much fungicidal value as the solution volume for volume, but varied with the magnesium content of the lime used in the spray. Magnesium oxid, according to laboratory tests, was found to have considerable fungicidal value.

On apple trees the scab was reduced from 79.4 per cent to 29.5 per cent by a 1:30 lime-sulphur spray, and to 10.9 per cent when arsenate of lead was added to the spray. On pear trees 3 applications of a 1:40 solution of lime sulphur reduced the early pedicel infection of 73 per cent to 13 per cent, while the same concentration of lime sulphur with lead arsenate reduced it to 6 per cent with only one application.

Comparisons of properly prepared home-boiled concentrated and commercial lime-sulphur sprays showed that the control was practically equal in each case. It is claimed that the precipitation of the sulphur present in the lime-sulphur solutions by means of carbon-dioxid gas did not affect the fungicidal properties of the spray, at least when used for brown rot on Atlanta peaches, where it reduced the rot from 45 per cent to 1.5 per cent with 2 applications of a 1:30 lime-sulphur solution alone, and to 6.5 per cent by one application. When the lime-sulphur and lead-arsenate spray was applied with the gas sprayer, serious injury to the foliage of the peach trees resulted, apparently due to the action of the gas on the arsenical present; on apples this caused only slight injury in the case tested.

The first spraying before the blossoms open is chiefly instrumental in giving a better set of fruit when the early season favors scab infection, and in preventing foliage injury from later applications by keeping the fungus off the leaves. The second application after the blossoms fall is usually the most important one in keeping the fruit free from scab. The third application two weeks later seemed from the experiments to be of little importance during 1909 and 1910.

For controlling apple scab, 4 applications of a 1:40 lime-sulphur solution to which 2 lbs. of lead arsenate has been added is advised. The first application should come just before the blossoms open, the second after the blossoms fall, the third two weeks later, and the fourth 9 weeks after the blossoms fall. For pear scab, the number of applications will have to be increased in orchards where the scab fungus has become well established on the twigs, as the fungus in these infected twigs continues to grow throughout the season, constantly producing a crop of spores for the continuous infection of leaves and fruit.

Studies of the fungicidal value of lime-sulphur preparations, E. WALLACE, F. M. BLODGETT, and L. R. HESLER (*New York Cornell Sta. Bul. 290, pp. 167–207, pl. 1, figs. 2*).—A report is made on the results of experiments for testing the fungicidal value of different strengths of lime-sulphur mixtures.

The method of testing the fungicide was as follows: Glass slides were sprayed with the material to be tested and subjected to atmospheric conditions until the coating of spray had thoroughly dried; then drops of water containing viable spores of the fungus were placed on the sprayed slides, and also as checks on unsprayed slides. The number of spores which germinated on the slides was used as a criterion of the germicidal power of the spray under consideration.

Lime-sulphur solutions, at a strength safe for foliage, were found by both field and laboratory tests to be only fairly effective as a fungicide. In general, a stronger concentration was required to prevent germination of conidia of scab (*Venturia inæqualis*) than those of brown rot (*Sclerotinia fructigena*), and still stronger for apple canker (*Sphæropsis malorum*). Arsenate of lead used alone seemed to have some fungicidal value which showed up better in the field than in the laboratory tests, probably due to its adhesive properties which kept the surface of the host coated with the poison so that the fungus hyphæ could not penetrate the leaf. The addition of arsenate of lead to the lime-sulphur material increased the fungicidal value of the mixture (see above). The action of carbon dioxid on the lime sulphur, although entirely changing its chemical composition, did not materially affect its fungicidal value. The addition of lime or of iron sulphate to the lime-sulphur solution seemed to increase its efficiency slightly. When arsenate of lead was added to the iron-sulphate lime-sulphur mixture, the increase in efficiency observed when arsenic was added to the lime-sulphur mixture did not occur.

The spore itself seems to be active in bringing into solution small quantities of the fungicide, which in turn prevents germination.

The preparation of copper sprays, G. CHAPPAZ (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 10, pp. 289–294*).—The author gives the formulas and describes the methods of preparing the various copper sprays which are used in combating fungus diseases of the orchard.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Seed-eating mammals in relation to reforestation, N. DEARBORN (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 78, pp. 5, figs. 3*).—This circular reports the results to date of investigations conducted by the Biological Survey in cooperation with the Forest Service for the purpose of devising methods of protecting seeds from destructive rodents. It is stated that the protection of newly planted seeds from the attacks of mice, chipmunks, ground squirrels, and other rodents, the depredations from which collectively continue the year through, furnish one of the most serious problems connected with the reforestation of treeless areas within the National Forests.

In exhaustive trappings on a half acre containing 2,000 seed spots, 3 chipmunks and 11 white-footed mice were secured which in the course of 3 days had pilfered 70 per cent of the seed. One of the chipmunks was seen to visit 88 seed spots in 4 minutes. In a reforesting experiment in the Black Hills by the Forest Service, from 30 to 70 per cent of the seed was destroyed by chipmunks and mice within 6 days after planting. The chief seed eaters concerned are Say's ground squirrel (*Callospermophilus lateralis*), thirteen-lined ground squirrel (*Citellus tridecemlineatus pallidus*), Rocky Mountain chipmunk (*Eutamias quadrivittatus*), and white-footed mouse (*Peromyscus maniculatus rufinus*).

Protective coatings proved inefficient and the use of poisoned bait is recommended, preferably before seeding. Two formulas are given with directions for the preparation of poisoned bait, the first of which consists of wheat 1 bu., water 1 qt., starch 2 tablespoonfuls, saccharine 2 teaspoonfuls, and strychnia (pulverized) 2 oz.; the second of rolled oats 25 qt., strychnia (pulverized) 1 oz., saccharine 1 teaspoonful, and water 6 qt. The second is a much more attractive bait and one much easier to prepare, but the cost of the rolled oats considerably exceeds that of wheat.

Ordinarily in distributing poisoned wheat about 20 kernels should be dropped every 3 or 4 ft. along parallel lines about 5 yds. apart, an extra quantity being left under logs and shelving bowlders. At this rate a bushel of wheat is sufficient for about 40 acres. Poisoned bait may be protected from rain and guarded from birds or poultry by placing it under pieces of bark or small piles of stones.

A sack for distributing poisoned grain, made of denim or other strong cloth with a shoulder strap and a narrow wooden bottom fitted with a simple dropping device, is described and the details relating to its structure made clear by figures.

The mammals of Europe, E. L. TROUESSART (*Faune des Mammifères d'Europe. Berlin, 1910, pp. XVII+266; rev. in Nature* [*London*], *85* (*1910*), *No. 2140, pp. 3, 4*).—This is a descriptive catalogue of the mammals of Europe. As regards the distribution of the European fauna, the author recognizes four distinct areas, namely, Central European, Arctic, Eastern or Steppe, and African or Mediterranean.

Our vanishing shorebirds, W. L. MCATEE (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 79, pp. 9, figs. 3*).—This circular calls attention to the fact that shorebirds have been hunted until only a remnant of their once vast numbers is left. Their limited powers of reproduction, coupled with the natural vicissitudes of the breeding period make their increase slow and peculiarly expose them to danger of extermination. Emphasis is placed upon the great need of better protection, especially in view of their economic importance, which is discussed.

Reptiles of the world, R. L. DITMARS (*New York, 1910, pp. XI+373, pls. 90*).—The author gives in a popular manner a general survey of the reptiles of the world. It is illustrated by plates from photographs taken from life.

Papers on insects affecting stored products, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Bul. 96, pt. 1, pp. 18, figs. 2*).—Three papers are here presented.

A list of insects affecting stored cereals (pp. 1-7).—Seventy-six species of insects affecting stored cereals and cereal products are listed, together with their common names, brief references to their literature, and notes on their feeding habits.

The Mexican grain beetle (*Pharaxonotha kirschi*) (pp. 8-13).—While not permanently established in this country, the Mexican grain beetle has come repeatedly under the author's observation. It was first observed infesting stored grain in the foreign exhibits at the World's Columbian Exposition at

Chicago, in 1893, at which time it was practically unknown to American scientists. This beetle has since been received in stored corn from the State of Oaxaca, Mexico. The original generic and specific descriptions are reproduced and descriptions given of its immature stages. The literature relating to the species is considered in connection with a bibliography of 10 titles.

Adults placed in a rearing jar of fresh meal, with slices of raw potato to furnish additional moisture, and kept in a cool room showed conclusively that they were able to withstand the average temperature of an ordinary mill, warehouse, or granary of a latitude such as that of the District of Columbia. It is stated that the beetles are much more active than the meal-feeding tenebrionids. At summer temperature the life cycle from egg to adult was found to be passed in 32 days.

The Siamese grain beetle (*Lophocateres pusillus*) (pp. 14–18).—This beetle was found for the first time in rice and other cereal exhibits from Siam, Liberia, and Ceylon, at the World's Columbian Exposition in 1893. It has since been found to be established at Charleston, S. C., and Houston, Galveston, and Brownsville, Tex., and has been received in grain from New Braunfels, Tex., Peru, Guatemala, Java, Siam, and in paddy rice from India that was traced to Georgetown, Demerara. Rice, rye flour, beans, soy beans, eggplants, and gourd seeds have been found infested by it. The original generic and specific descriptions are reprinted, together with a translation of a description of the larva. A bibliography of 8 titles is appended.

Insects injurious to forests and forest products.—Damage to chestnut telephone and telegraph poles by wood-boring insects, T. E. Snyder (*U. S. Dept. Agr., Bur. Ent. Bul. 94, pt. 1, pp. 11, pls. 2, figs. 3*).—The author has found that serious damage is being done to the bases of standing chestnut telephone and telegraph poles in Maryland, Virginia, and other States.

In this paper particular attention is given to investigations made of the chestnut telephone pole borer, *Parandra brunnea*. Its injury to poles consists in large mines in the wood near the line of contact of the pole with the ground, necessitating the frequent resetting or even replacement of the damaged poles. The borers usually work in the outer layers of the wood at the base of the pole for a distance of from 2 to 3 ft. below, and sometimes from 1 to 2 ft. above the line of contact of the pole with the surface of the ground. The greatest damage is to that area just below and just above the surface of the ground, where the conditions of air and moisture are more favorable. Often, however, the entire butt up to a distance of 4 to 6 ft. and higher, according to the depth of setting, is mined. Poles that appear sound on the exterior may have the entire basal interior riddled and the work of the borers not be noticed until the poles break off. "It has also been determined that this beetle damages many species of living forest, fruit, and shade trees that have been previously injured by fire or other causes, and often leads to the destruction of trees that would otherwise recover from such wounds, and while not normally a primary enemy of trees, may thus become of more than secondary importance."

The author concludes that the eggs are deposited from August to October in crevices on the exterior of the pole near the surface of the ground, the adults having been found flying from July to September. The pupal stage is passed in a broad chamber in the pole. The species is very widely distributed, ranging from Ontario, Canada, to Texas, eastward to the Atlantic coast, and westward to Arizona and southern California.

Inspections made near Dover, N. J., of a test line of poles set 8 years before and variously treated for preservation (brush treatments with a patented carbolineum preservative and spirittine, charring the butt, setting the pole in sand, and setting in small broken stone) and alternating with untreated poles, show that although these methods may temporarily check the inroads of the wood-boring insects, they will not keep the insects out of the poles. In inspections made at Warren, Pa., and at Falconer, N. Y., of similar test lines treated by the creosote open tank method of impregnation and brush treatments of creosote, wood creosote, creolin, 2 different carbolineum preservatives, and tar, and which have been set in the ground for a period of 5 years, it was found that with the exception of the brush treatments with creolin and tar all were efficient in preventing the attacks of wood-boring insects.

"Methods of treating poles superficially by brushing with various preservatives have proved to be temporarily efficient in keeping wood-boring insects out, if the work is thoroughly done and not only the butt, but also the base, is treated. . . . It is evident that impregnating the poles with creosote by some standard process (either the open-tank or the cylinder pressure processes) will keep wood-boring insects out and preserve the poles for a much longer period than they would last untreated."

Brief notes are presented on the common injury to poles by associated wood-boring insects, including white ants (*Termes flavipes*), the most common source of injury; a giant round-headed borer (*Prionus* sp.) sometimes found in poles, usually in association with the chestnut telephone pole borer; a large scarabæid (*Polymœchus brevipes*), previously found in decayed oak railroad ties, which causes the poles to break off sooner than they otherwise would; a flat-headed borer (*Buprestis rufipes*); wireworms (*Alaus* sp.); a large black carpenter ant (*Camponotus pennsylvanicus*); and a small black ant (*Cremastogaster lineolata*).

A list of some available publications on wood preservation is appended.

Damage to telephone and telegraph poles by wood-boring insects, T. E. Snyder (*U. S. Dept. Agr., Bur. Ent. Circ. 134, pp. 6, figs. 3*).—This circular consists of revised extracts from Bulletin 94, part 1, noted above.

Studies in the life histories of Australian Odonata, R. J. Tillyard (*Proc. Linn. Soc. N. S. Wales, 34 (1909), pt. 4, pp. 697–708, pl. 1, fig. 1*).—In this third paper (see E. S. R., 22, p. 356) notes are presented on the new species *Phyllopetalia patricia.*

An investigation of the locust pest in the Philippines, D. B. Mackie (*Philippine Agr. Rev. [English Ed.], 3 (1910), No. 4, pp. 227–240*).—An account of the life history, natural enemies, and methods of destroying locusts.

The African migratory locusts, W. La Baume (*Tropenpflanzer, Beihefte, 11 (1910), No. 2, pp. 65–128, pls. 4, figs. 10*).—Part 1 of this paper takes up briefly the general classification, geographical distribution, biology, natural enemies, and methods of combating locusts; part 2 is devoted to a more detailed account of six species.

Notes on some new and rare Thysanoptera (Terebrantia), with a preliminary list of the known British species, R. S. Bagnall (*Jour. Econ. Biol., 6 (1911), No. 1, pp. 1–11*).—This paper presents notes on 9 species representing 6 genera, of which 5 species and 1 genus (Amblythrips) are described as new. The list presented includes 74 species, representing 29 genera, known to occur in the British Isles.

West African Hemiptera injurious to cocoa, G. C. Dudgeon (*Bul. Ent. Research, 1 (1910), No. 3, p. 177*).—*Sahlbergella singularis*, a species nearly allied to the bark-sapper (*S. theobroma*), is reported to have been found badly infesting cocoa plantations in Bompata, Ashanti.

On the presence in Dahomey and method of transmission of Leptomonas davidi, a flagellate parasite of the Euphorbiaceæ, G. Bouet and E. Roubaud (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No 2, pp. 55–57, figs. 12*).—The authors have found *L. davidi* in the latex of *Euphorbia pilulifera* in Dahomey but not in several other species examined. They do not think it to be pathogenic as reported by Lafont (E. S. R., 24, p. 359). A lygeid bug, *Dieuches humilis*, was found to transmit the parasite from plant to plant.

On the transmission of Leptomonas davidi of euphorbias by a hemipteron, Nysius euphorbiæ, A. LAFONT (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 2, pp. 58, 59*).—Experiments conducted show that a lygeid (*N. euphorbiæ*) conveys the flagellate parasite *L. davidi* from diseased to healthy plants.

American Psyllidæ, I, II (Triozinæ), D. L. CRAWFORD (*Pomona Jour. Ent., 2 (1910), Nos. 2, pp. 228–237, figs. 2; 4, pp. 347–362, figs. 3*).—In the first paper the author presents a provisional key to the genera and species of the subfamily Triozinæ, together with descriptions of 4 new species belonging to the genus Trioza. In the second paper 14 species and 1 variety of Trioza are described as new.

Three species of apple plant lice in Oregon, H. F. WILSON (*Oregon Sta. Circ. 12, pp. 3–8*).—A brief account is given of 3 species of plant lice that are causing serious damage to the apple in Oregon, namely, the green, brown, and woolly apple aphis. An account of remedial measures is included.

Aphididæ of southern California, V, E. O. ESSIG (*Pomona Jour. Ent., 2 (1910), No. 4, pp. 335–338, figs. 2*).—In this fifth paper (E. S. R., 24, p. 559) the author deals with *Aphis hederæ* and *Nectarophora pisi*.

A new mealy bug infesting walnut, apple, and pear trees, E. O. ESSIG (*Pomona Jour. Ent., 2 (1910), No. 4, pp. 339–345, figs. 2*).—A mealy bug found to infest walnut, apple, and pear trees in Ventura County, Cal., is described as *Pseudococcus bakeri* n. sp. The species has not as yet become of economic importance.

The citrus mealy bug, E. O. ESSIG (*Pomona Jour. Ent., 2 (1910), No. 4, pp. 289–320, figs. 9*).—This paper deals with the general history and distribution of *Pseudococcus citri* in California, its destructiveness, and quarantine measures, gives technical descriptions of the male and female, and discusses its life history, bionomics, natural enemies, and artificial control.

A synonymic bibliography is appended.

Some further observations on the scale insects (Coccidæ) of the Uganda Protectorate, R. NEWSTEAD (*Bul. Ent. Research, 1 (1910), No. 3, pp. 185–199, figs. 10*).—Nine species and 1 variety, representing the genera Inglisia, Lecanium, Ceroplastes, Dactylopius, Chionaspis, and Diaspis, are described as new.

The alfalfa caterpillar (Eurymus eurytheme), V. L. WILDERMUTH (*U. S. Dept. Agr., Bur. Ent. Circ. 133, pp. 14, figs. 8*).—This circular is a partial report of work done by the author in the Imperial Valley, Cal., during 1910.

During the last 4 years the caterpillars of this butterfly have been reported as feeding on, and in some cases doing a large amount of damage to, growing alfalfa in the Southwest. In 1906 it was reported to be injuring lucern fields in Bighorn County, Wyo., and the following year damaging alfalfa at Hanford, Cal., and it is known to have injured alfalfa in Utah and Kansas. In Salt River and Yuma valleys, Ariz., and in the Sacramento Valley and in the irrigated alfalfa regions of south-central California, the pest is quite numerous during certain years and causes more or less damage. The injury during 1909 in the Imperial Valley, Cal., resulting in a loss of hundreds of dollars on a 320-acre ranch and similar losses on other ranches, led to the inauguration of the investigations here reported. In the West this insect is known to occur from Mexico northward into the Dominion of Canada, thus covering the chief alfalfa growing section of the United States.

Descriptions are given of the various stages in the life of this insect. There were found to be 4 distinct generations in the Imperial Valley in 1910, the last being less distinct than the others. The first generation covered the period from March 15 to April 30; the second from May 1 to May 28; the third from May 28 to June 30; and the fourth from June 30 to July 15. Besides alfalfa the caterpillars are known to feed upon the 2 buffalo clovers, *Trifolium reflexum* and *T. stoloniferum*, which probably constitute its original native food plants, on white clover (*T. repens*), and in California on *T. tridentatum*, but does not appear to attack red clover. Hosackia, ground plum (*Astragalus caryocarpus*), and *A. crotalariæ* have also been reported to be food plants of this insect. The butterfly is known to oviposit on *Medicago hispida*, and at Indio, Cal., on July 1 the author found larvæ feeding on sweet clover (*Melilotus alba*), which they seemed to prefer to a patch of alfalfa growing close by.

Two tachinid parasites were bred by the author, namely, *Euphorocera claripennis* from the larva, and *Masicera* sp. from the pupa. Several specimens of a chalcidid parasite (*Limnerium* sp.) were reared from the larvæ and 1 specimen of *Chalcis ovata* from a pupa. The cotton bollworm, which is quite prevalent in the Imperial Valley and often mistaken for the alfalfa caterpillar, is said to be a ravenous enemy of the caterpillar, never eating alfalfa as long as it can find the larvæ or pupæ of Eurymus. A disease which destroys both the pupa and larva, but more often the larva, is prevalent all over the valley at all seasons of the year.

It is stated that control measures for this pest must be based upon methods of handling the crop. The author recommends that where caterpillars threaten the destruction of a crop of alfalfa before the hay can possibly mature, that it be mowed at once, cutting low and clean, especially along the ditch banks, borders, and turnovers. By so doing a large majority of that generation of caterpillars will be starved, thereby protecting the next crop as well as saving a part of the one already affected. Thorough and frequent irrigations should follow as soon as the crop of hay is removed from the ground.

A California orange dog, K. R. COOLIDGE (*Pomona Jour. Ent., 2 (1910), No. 4, pp. 333, 334*).—The author has found *Papilio zelicayn* to be extremely abundant about Porterville and Lindsay in the San Joaquin Valley, Cal., the eggs being commonly deposited upon the lower surface of orange leaves. The species is widely distributed along the west coast from Mexico to Alaska and eastward to Montana and Colorado. Its normal food plants include various species of Umbelliferæ, in the vicinity of San Francisco *Fœniculum vulgaris* and *Carum kelloggii* being most commonly fed upon.

It is thought quite probable that this insect will become of economic importance.

Scale-eating moths, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 21 (1910), No. 9, p. 801*).—Attention is called to the fact that all the Australian species belonging to the noctuid genus Thalpochares are carnivorous in the caterpillar stage and feed almost exclusively upon the Coccidæ. Caterpillars of *T. cocoophaga* are known to be a great factor in their native state in devouring the white scale (*Eriococcus coriaceus*) upon young eucalypts and more recently have attacked the brown olive scale (*Lecanium oleæ*), particularly upon citrus trees, in some districts almost freeing the trees of this pest. In addition to *T. pulvinariæ*, which feeds upon *Pulvinaria maskelli*, the author has bred another pearl-white species (*T. dubia*) from *Ingilisa forminifer* and also from a Lecanium upon the cultivated fig. It is said that a fourth species, *T. pusilla*, has also been described from Australia with the same habits.

A syntomid moth imported with bananas, T. D. A. COCKERELL (*Canad. Ent., 42 (1910), No. 2, pp. 60, 61*).—A moth collected among bananas at Boulder, Colo., which is supposed to have been imported therewith from Central America, is described as *Ceramidia musicola* n. sp.

The wheat-head army worm (Meliana albilinea) as a timothy pest, R. L. Webster (*Iowa Sta. Bul. 122, pp. 324–347, figs. 15*).—During the summer of 1910 this insect became very abundant in northern Iowa and caused a large amount of damage, in some fields from 50 to 90 per cent of the timothy heads being injured. Their injury is caused by gnawing into the heads of timothy, wheat, rye, and other small grains, the timothy being preferred. The worms commence feeding at the bottom of the head and work upward, sometimes eating only one side or even less and sometimes taking practically all but the stem. Badly injured fields appear dry and brown in July and the denuded timothy heads are conspicuous even at some little distance.

The past history, destructiveness, distribution, food plants, classification, life history, and natural enemies of this pest are dealt with, together with a bibliography of 24 titles. The species appears to be a native of America, where it is found from Nova Scotia to Alberta in the North, to Delaware and New Jersey in the East, and at Glenwood Springs, Colo., and southern Arizona in the West. It has also been reported to occur in Mexico, Chile, and Argentina. In addition to timothy, it has been found to feed upon wheat, barley, rye, oats, sweet corn, sorghum, wild rice, Indian corn, and various grasses.

The author finds 2 distinct generations to occur in Iowa. Emerging in the spring from the pupal stage in which the winter is passed, eggs are deposited which commence to hatch toward the latter part of May. The young larvæ begin to feed first on the tender green leaves of young timothy plants and later attack the heads. By the first of July some of the caterpillars are full grown, although they are not common until about the middle of that month. Mature larvæ go into the soil to transform, the moths appearing again in August. The second generation of worms first appear in the field about the middle of August. The author's observations indicate that in the spring the eggs are deposited on the crown of timothy plants only, whereas in August they are deposited in the sheath of the plant. From 3 to 10 days are required for their incubation, and about a month for the larva to complete its growth and enter the ground. In 16 cases 31 days was the average time spent as a pupa, the range being from 18 to 50 days. Technical descriptions of the egg, 7 larval instars, pupa, and adult are included.

Three tachinid parasites (*Winthemia quadripustulata*, *Euphorocera claripennis*, and *Metachæta helymus*) were reared from the larvæ, the first-named being by far the most common. Three hymenopterous parasites (*Microgaster auripes*, *Microplitis* n. sp., and *Paniscus geminatus*) were also bred from the larvæ, the former being the most common. *Pentarthron retorridus* was bred from the eggs and *Apanteles læviceps* is reported to have been reared from larvæ collected in New Mexico.

As preventive and remedial measures the author recommends keeping the wild grasses cut along the roadsides and fence corners, early fall plowing which will bury the half grown caterpillars, and early fall pasturing (i. e., before the middle of September) to throw the second brood of caterpillars out of food.

A generic synopsis of the Itonidæ, E. P. Felt (*Jour. N. Y. Ent. Soc., 19 (1911), No. 1, pp. 31–62*).—The author here presents the results of studies of the American species, many of the types of European genera, and the literature relating to the gall midges better known as the Cecidomyiidæ.

Two new gall midges, E. P. Felt (*Ent. News, 22 (1911), No. 3, pp. 109–111*).—Two West Indian Cecidomyiidæ, *Asphondylia vincenti* reared from the fruits of *Jussiæa linifolia* and *J. suffrutiosa*, and *Hyperdiplosis eupatorri* bred from a gall on the upper surface of the leaves of Eupatorium, are described as new.

Endaphis in the Americas, E. P. FELT (*Ent. News, 22 (1911), No. 3, pp. 128, 129*).—Two species of the European cecidomyiid genus Endaphis, namely, *E. abdominalis*, reared in Peru from cotton leaves badly infested with galls containing mites, and *E. americana*, reared from galls of *Eriophyes fraxiniflora* on *Fraxinus velutina* at Prescott, Ariz., are described as new.

Dengue and Stegomyia, J. LEGENDRE (*Bul. Soc. Path. Exot., 4 (1911), No. 1, pp. 26–30*).—During the course of an epidemic of dengue fever which prevailed for many months at Hanoi, French Indo-China, during which the major part of the population, both native and European, suffered, the author made numerous observations and was led to conclude that the Stegomyia mosquito was the active agent in its transmission.

Mosquitoes and malaria, H. WAITE (*Biometrika, 7 (1910), No. 4, pp. 421–436, dgms. 5*).—A study of the relation between the number of mosquitoes in a locality and the malaria rate.

A preliminary report on the investigation into the breeding places of the sand fly in Malta, P. J. MABETT (*Jour. Roy. Army Med. Corps, 15 (1910), No. 3, pp. 286–291*).—Notes on the life history and habits of *Phlebotomus papatasii*.

Myiasis dermatosa due to the ox warble flies, R. T. MILLER (*Jour. Amer. Med. Assoc., 55 (1910), No. 23, pp. 1978, 1979*).—The author reports a case in which the larva of *Hypoderma lineata* in the second stage was taken from the knee of a human patient from Roanoke, Va.

The Mexican orange maggott (Anastrepha [Trypeta] ludens), D. L. CRAWFORD (*Pomona Jour. Ent., 2 (1910), No. 4, pp. 321–332, figs. 4*).—The author reports having found this pest in 1910 at several points in the State of Chiapas, Mexico, and that it is also present in the fruit districts of Cordova, Oaxaca, Jalapa, and Colima. A parasite taken by him in the act of depositing eggs in the maggots in oranges, mangoes, and guavas has been identified as *Diachasma* sp.

The author considers the great and immediate danger from the maggot to be to the citrus groves of Texas, New Mexico, and Arizona.

On the raising of sterile flies, E. WOLLMAN (*Ann. Inst. Pasteur, 24 (1911), No. 1, pp. 79–88, figs. 2*).—A contribution to the knowledge of the rôle of microbes in digestive tracts. *Calliphora vomitoria* and *Lucilia cæsar* were used in the studies here reported.

On the biology and pœcilogonic viviparity of the cattle fly (Musca corvina) in tropical Africa, E. ROUBAUD (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 3, pp. 158–160*).—Observations made in Dahomey are here reported.

Studies of the stomoxydes of Dahomey, B. ROUBAUD (*Bul. Soc. Path. Exot., 4 (1911), No. 2, pp. 122–132*).—The stomoxydes are represented in Dahomey by 2 genera, Stomoxys and Lyperosia. Systematic and biological notes are presented on 8 species of Stomoxys that occur in the colony. A single and little-known species, *longipalpis*, is the only representative of the genus Lyperosia.

In September the author received from Abomey a collection of dead flies (*S. calcitrans*) that were affixed in large numbers to potato leaves and also reported by the sender to be found upon the bodies of asses. Examination showed that they had been destroyed by an entomophthorous fungus. In experiments conducted it was discovered that through the ingestion of spores, the house fly could also be infected. The complete development of the mycelium that causes the death of the fly takes place in 24 hours, and the maximum period required by the fungus to kill the fly does not exceed 4 days.

On West African Trypetidæ (fruit flies), W. M. GRAHAM (*Bul. Ent. Research, 1 (1910), No. 3, pp. 161–171, pls. 3, fig. 1*).—Two species of fruit flies of the genus Ceratitis and 3 of the genus Dacus are described as new.

A new dipterous parasite of bats, T. D. A. COCKERELL (*Canad. Ent., 42 (1910), No. 2, pp. 59, 60*).—The hippoboscid here described as *Trichobius corynorhini* n. sp. was taken from a bat (*Corynorhinus macrotis pallescens*), collected in Boulder County, Colo.

Rat fleas in German East Africa, A. SCHUBERG and P. MANTEUFEL (*Arb. K. Gsndhtsamt., 33 (1910), No. 3, pp. 559–561; abs. in Bul. Inst. Pasteur, 8 (1910), No. 10, p. 476*).—Of 258 fleas taken from *Mus rattus, M. decumanus,* and *M. alexandrinus* at Daressalam, 172 or 66.6 per cent were *Læmopsylla cheopis*, 28 or 10.9 per cent were *L. scopulifer*, and 58 or 22.5 per cent were *Sarcopsylla gallinacea.*

The plague in North China, J. J. MULLOWNLY (*Jour. Amer. Med. Assoc., 56 (1911), No. 10, p. 737*).—It is stated that the rat and the rat flea apparently do not have as much to do with the spread of pneumonic plague as is the case in epidemics of the bubonic type. "It has been conclusively shown that the disease, in the pneumonic form, is transmitted by the sputum and by contact with persons sick of the disease, and that the wearing of respirators is good prophylaxis."

Papers on cereal and forage insects.—The timothy stem-borer (Mordellistena ustulata), a new timothy insect, W. J. PHILLIPS (*U. S. Dept. Agr., Bur. Ent. Bul. 95, pt. 1, pp. 9, pl. 1, figs. 4*).—This new timothy insect has been found in Kentucky, Tennessee, Ohio, Indiana, Illinois, and Missouri, boring in the stems of timothy and in many cases traversing the entire length from the top joint to the bulb. Thus far, however, it has not proved a serious pest, having been found only in small numbers at any given point. It occurs in the Middle and Southern States, the adults having been captured as far east as Pennsylvania and been bred from material collected in Virginia.

As a rule the eggs are deposited at or slightly below the center of the first or second joint in timothy but much farther down the stem in other grasses. From here the larva bores into the center of the stem and then begins its downward journey to the bulb or root. "This species has been reared from timothy, orchard grass (*Dactylis glomerata*), quack grass (*Agropyron* sp.) and *Agrostis alba*, while larvæ that were supposedly this species have been found in bluegrass (*Poa* spp.) and cheat (*Bromus secalinus*)."

Detailed technical descriptions are given of the egg, larva, and pupa. "The larval stage covers a period of about 11 months. Nothing could be learned about the number of molts, as the larvæ will not develop if their galleries are disturbed. The pupal stage varies from 11 to 16 days, depending, apparently, upon the temperature. The adult beetles will live from 5 to 6 days in confinement, but they will probably survive a much longer period in the open. The insect hibernates in the larval stage. About the time freezing begins in the fall the larvæ are down to the bulb or crown of the root, where they are well protected from cold."

Three species of parasites have been bred from the larvæ, namely, *Heterospilus mordellistenæ* in Ohio and Indiana, *Schizoprymnus phillipsi* in Indiana, and *Merisus mordellistenæ* in Ohio and Indiana. It is thought probable that the parasitic enemies keep the beetles in check. In case of a serious outbreak it is recommended that a short crop rotation be adopted, allowing a field to remain in timothy sod not more than 2 or 3 years, and thus preventing the stem-borer from becoming well established. Borders of the fields and waste places should be mowed frequently during the months of June and July.

An insect pest in belladonna, P. É. F. PERRÉDÈS (*Brit. and Colon. Druggist, 58 (1910), No. 5, pp. 107–109, figs. 3; Pharm. Jour. [London], 4. ser., 31 (1910), No. 2441, pp. 135–137, figs. 3*).—A flea beetle (*Epitrix atropæ*) is reported to be the source of considerable damage to belladonna plants in the vicinity of Hitchin, Hertfordshire, especially during dry seasons.

The cherry stem borer, Semasia wœberiana, W. E. COLLINGE (*Jour. Bd. Agr. [London], 17 (1911), No. 10, pp. 828-830*).—This insect was the source of injury to cherry trees in various parts of Kent and Hertfordshire in 1908 and increased in abundance during 1909 and 1910.

A new cotton pest, AULMANN (*Tropenlandw., Beilage Kolon. Ztschr., 1 (1911), Nos. 1, pp 3, 4; 3, pp. 9-11, figs. 9*).—The curculionid beetle *Alcides brevirostris* is reported to injure cotton in German East Africa by girdling the stalks.

Steirastoma depressum, "cocoa-borer beetle," J. L. GUPPY (*Bul. Dept. Agr. Trinidad, 9 (1910), No. 66, pp. 186-191*).—An account is given of the life history, distribution, and control of the cocoa-borer beetle which has been a serious pest and source of annoyance to planters in several parts of Trinidad. It is also said to be found in Venezuela, Colombia, Surinam, British Guiana, Grenada, and Guadeloupe.

Notes on Lixus marginatus, M. A. YOTHERS (*Canad. Ent., 42 (1910), No. 3, pp. 69-71, pl. 1*).—*L. marginatus* is reported to have been bred from swellings, about the size of peas, on the stems of *Polygonum littorale* growing at East Lansing, Mich.

Revision of the Australian Curculionidæ belonging to the subfamily Cryptorhynchides, A. M. LEA (*Proc. Linn. Soc. N. S. Wales, 34 (1909), pt. 4, pp. 593-635*).—A continuation of the work previously noted (E. S. R., 22, p. 363).

The asparagus miner, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Circ. 135, pp. 5, figs. 2*) —A revised reprint from Bulletin 66, previously noted (E. S. R., 19, p. 158).

Studies of the honeybee (Apis mellifica), E. ZANDER (*Ztschr. Wiss. Zool., 95 (1910), No. 4, pp. 507-550, pls. 3, figs. 14*).—The author publishes the first two of a series of studies of the honeybee. The first paper contains a full description of the development and comparative anatomy of the thoracic exoskeleton of bees and wasps with special reference to the disputed point of the exact composition of the thorax. In the second paper the structure and mechanism of the flight apparatus of the honeybee are discussed by F. Stellwaag.

A new pteromalid parasitic on Tortrix fumiferana, C. T. BRUES (*Canad. Ent., 42 (1910), No. 8, pp. 259, 260*).—*Nasonia tortricis*, the species here described as new, was bred from pupæ of the spruce budworm (*T. fumiferana*), collected at Baskatong, Quebec.

Descriptions of 3 new North American species of the mymarid genus Polynema, parasitic on membracid eggs, with a list of the species described since the year, 1898, A. A. GIRAULT (*Jour. N. Y. Ent. Soc., 19 (1911), No. 1, pp. 12-23*).—The parasites here described are *P. striaticorne*, parasitic on the egg of *Ceresa bubalus* and *C. taurina* in New York, Missouri, and Illinois; *P. enchenopæ*, bred from the eggs of the membracid *Enchenopa binotata* in Illinois; and *P. citripes*, a manuscript name given by Ashmead.

Some remarks on the parasites of the large larch sawfly, Nematus erichsonii, J. MANGAN (*Jour. Econ. Biol., 5 (1910), No. 3, pp. 92-94*).—In the Lake district in 1908 about 6 per cent of the cocoons of this sawfly were parasitized by *Mesoleius aulicus*. In 1909 the proportion had increased to 15 per cent, while in 1910, some 62 per cent were parasitized. The ovaries from individual parasites kept in captivity usually contained about 30 eggs, although in some cases as many as 40 mature eggs were found. In 1909 about 0.3 per cent of the cocoons furnished specimens of the ichneumon *Microcryptus labralis*. A tachinid, *Exorista dubia*, was also bred from the cocoons. The parthenogenetic origin of the majority of the sawfly larvæ is stated to have been evident, as hardly more than 0.2 per cent of the sawflies emerged were males.

The larch sawfly (Lygæonematus erichsonii) in Minnesota, A. G. Ruggles (*Canad. Ent., 42 (1910), No. 3, pp. 93, 94*).—Brief notes are presented upon the occurrence of the larch sawfly which has become a very serious pest of tamaracks in northern Minnesota.

Some new and unrecorded endoparasites from Australian chickens, Georgina Sweet (*Proc. Roy. Soc. Victoria, n. ser., 23 (1910), No. 1, pp. 242–256, pls. 5*).—The species recorded from chickens are *Choanotænia infundibulum* which is fairly common in the suburbs of Melbourne, *Davainea cesticillus*, *D. tetragona*, *D. varians* n. sp., *Heterakis perspicillum* which was found in the small intestine of 25 per cent of the fowls examined from Victoria, *H. papillosa* which appears to be common in fowls around Melbourne, *H. maculosa*, *Trichosoma retusum*, and *Oxyspirura parvovum* n. sp. which causes "worm in the eye" in Queensland poultry. The last-mentioned species is extra-ocular, like *O. mansoni*, occurring in numbers beneath the nicitating membrane; at Cairns, North Queensland, it is very common, often being the source of serious loss.

A list of the metazoan parasites recorded to date from *Gallus domesticus* in Australia is appended.

The distribution of the Rocky Mountain spotted-fever tick, F. C. Bishopp (*U. S. Dept. Agr., Bur. Ent. Circ. 136, pp. 4, fig. 1*).—The account here presented of the distribution of *Dermacentor venustus* is based on 815 lots obtained from 225 different localities in 10 States, the representation being as follows: California 3, Colorado 15, Idaho 42, Montana 72, Nevada 11, New Mexico 2, Oregon 15, Utah 12, Washington 27, and Wyoming 26.

"The northern part of the Rocky Mountain region in the United States is the territory principally infested, but the river valleys and sagebrush plains to the west are more or less heavily infested. Although the spotted-fever tick occurs in the eastern edge of the Cascade Mountains, it does not appear to exist in the main Cascade range, and has never been found to the west of the divide formed by those mountains. It has been found in the western portion of the Black Hills of South Dakota, and probably occurs throughout those hills. There is no doubt that the species is common in southern British Columbia and possibly eastern Alberta. Two females were collected . . . at Kaslo, British Columbia. . . . This tick does not seem to be limited particularly as regards life zones. It appears to be most abundant in the Transition Zone, but occurs commonly in the Canadian and Upper Sonoran Zones. It is probably also to be found in the Hudsonian Zone. Specimens have been collected at various elevations from slightly over 500 ft. to nearly 9,000 ft. above sea level. The species seems to reach its highest development and occur in greatest numbers between 3,000 and 5,000 ft."

Attention is called to the fact that the abundance of this tick is greatly influenced by the presence of numerous host animals as well as by the protection afforded by timber. The immature ticks were found to feed almost exclusively on small mammals and adults on the large domestic animals. Mention is made of the fact that the distribution of the ground squirrel subgenus Colobotis corresponds very closely to the area in which the spotted-fever tick occurs.

Bird enemies of the Texas-fever tick and other ticks, W. L. McAtee (*Auk, 28 (1911), No. 1, pp. 136–138*).—The recent literature relating to the subject is reviewed. It is stated that "in the course of stomach examinations by the Biological Survey, the following birds have been found to eat ticks: Those eating Texas-fever ticks are killdeer (*Oxyechus vociferus*), upland plover (*Bartramia *longicauda*), and meadowlark (*Sturnella magna*); net ticks (*Dermacentor occidentalis*), dwarf hermit thrush (*Hylocichla guttata nana*); castor-bean ticks (*Ixodes* sp.), boat-tailed grackle (*Megaquiscalus major*), meadowlark, and house wren (*Troglodytes aëdon*); and *Gamasus* sp., the wren tit (*Chamæa fasciata*)."

New predaceous and parasitic Acarina, H. E. Ewing (*Psyche, 18 (1911), No. 1, pp. 37-43, pl. 1*).—Several of the 8 species here described are of economic importance, particularly *Tydeus coccophagus*, which was found in large numbers attacking the oyster-shell scale during August, and *Tarsonemus chionaspivorus*, taken from *Chionaspis* sp. on poplar, both at Ames, Iowa.

A common sumach gall produced by a mite, T. D. A. Cockerell (*Science, n. ser., 32 (1910), No. 831, pp. 796, 797*).—A mite which produces gall masses on *Rhus glabra cismontana* in Colorado is described as *Eriophyes rhoinus* n. sp.

An introduction to the physiology of the Protozoa, S. von Prowazek (*Einführung in die Physiologie der Einzelligen (Protozoen). Leipsic and Berlin, 1910, pp. VI+172, figs. 51*).—A comprehensive work on the physiology of the Protozoa.

A monograph of the tapeworms of the subfamily Avitellininæ, being a revision of the genus Stilesia, and an account of the histology of Avitellina centripunctata, L. H. Gough (*Quart. Jour. Micros. Sci. [London], n. ser., 56 (1911), No. 222, pp. 317-385, pls. 3, figs. 6*).—In this monograph 4 species of Stilesia are recognized, namely, *globipunctata*, *vittata*, *hepatica*, and *sjöstedti*. The genus Avitellina is erected for *S. centripunctata*, which occurs in the small intestine of sheep in Italy, Algeria, and South Africa.

Tapeworms of South American Felidæ, M. Lühe (*Zool. Jahrb., 1910, Sup. 12, No. 3, pp. 687-710, pls. 2, figs. 8; abs. in Jour. Roy. Micros. Soc. [London], 1911, No. 1, p. 49*).—The author finds that *Tænia oligarthra* from *Felis concolor* is nearly allied to *T. echinococcus*, and that *Cysticercus macrocystis* from *Lepus brasiliensis* is the bladder-worm stage of a new tapeworm, *T. macrocystis*, from species of Felis. *T. omissa* from *F. concolor* and from other species of Felis is described as new.

FOODS—HUMAN NUTRITION.

A bacteriological study of ham souring, C. N. McBryde (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 132, pp. 55, pls. 4, figs. 5*).—From an extended investigation the author concludes that ham souring as encountered in the wet curing process, where hams are entirely submerged in pickling fluids, is due to the growth within the ham of an anaerobic bacillus (*Bacillus putrefaciens* n. sp.).

This micro-organism was isolated and studied and its characteristics described. As the author points out, it belongs to the class of putrefactive anaerobes which are widely distributed in nature in dust, soil, and excrementitious matters, and as it or its spores may be present in the dust and dirt of packing houses, the hams may become contaminated in the various manipulations to which they are subjected.

"A preliminary study of the chemical changes which take place in the process of souring shows that these changes are of a putrefactive nature, and ham souring, as ordinarily encountered, is to be regarded as an incipient putrefaction. Hams which had been artificially soured by the injections of culture were compared with sour hams obtained from the packing house, and the putrefactive changes were found to be identical.

"Hams which have once become sour can never be restored to a sound condition, because of the chemical changes which result from the growth of the bacillus. . . .

"The salts of the pickling fluids have a marked inhibitory action on the ham-souring bacillus, and sours occur less frequently in regular-cure hams. In regular-cure hams the growth of the ham-souring bacillus is restricted and often completely inhibited as a result of the additional pumping which these hams receive, whereby they are more or less saturated with pickle at the beginning of the cure. . . .

"Under the present methods of curing, the partly pumped or mild-cure hams furnish the greater proportion of the sours, as these hams are not pumped in the body and the growth of the ham-souring bacillus within the bodies of these hams is not interfered with until the curing pickle has penetrated from the outside. . . . The percentage of souring in the mild-cure hams could be greatly reduced without materially affecting the cure by pumping these hams with their own curing pickle. . . .

"The only way by which ham souring could be entirely eliminated from the larger packing establishments under the present methods of curing would be to handle the hams throughout under aseptic conditions, and this, for obvious reasons, would be an impossibility. The losses from ham souring may be materially reduced, however, by greater care in handling the hams and the adoption of precautionary measures designed to prevent the introduction of contaminated foreign matter into the bodies of the hams, together with more thorough methods of pumping.'

Refrigeration of fresh and other meats in transit, D. I. Davis (*1. Cong. Internat. Froid, [Paris], Rap. et Commun., 1908, III, pp. 589–593, pls. 2*).—A discussion of methods followed in shipping meat in the United States.

Additional experiments on the glucose of eggs and its biological significance, V. Diamare (*Separate from Rend. Accad. Sci. Fis. e Mat. Napoli, 3. ser., 16 (1910), No. 7–9, pp. 242–244; abs. in Chem. Zentbl., 1910, II, No. 24, p. 1763*).—The author studied the occurrence of sugar in hen's eggs and turtle eggs. In eggs almost fully developed, dialyzable sugar was found in a quantity as great as or greater than that of the hydrolyzable sugar. In eggs not fully developed the latter was more abundant, while in very small eggs no glucose was identified.

The use of refrigeration in bread making, E. Brandeis (*1. Cong. Internat. Froid, [Paris], Rap. et Commun., 1908, III, pp. 98–112*).—On the basis of experimental data the importance of artificial refrigeration in modern bakeries is discussed. According to the author, low temperature hinders the deterioration of stored materials, lessens the danger from explosions, favors the change of gluten into soluble material by the agency of the enzym present in the flour, lessens the acid content of bread, acts favorably upon the bread-making quality of the flour, and is beneficial in other ways.

Experiments regarding sterilizing flour with reference to panary fermentation, A. J. J. Vandevelde (*Acad. Roy. Belg., Bul. Cl. Sci., 1910, No. 7, pp. 597–610*).—In connection with a study of the function of different organisms concerned in panary fermentation some experiments are reported in which flour was sterilized with a mixture of chloroform and acetone and with formalin.

The chloroform-acetone mixture seemed to destroy all the organisms present in the flour with the exception of *Bacillus mesentericus vulgatus*, but it also modified the properties of the gluten. Formalin proved to be either insufficient as a sterilizing agent or enough remained in the flour to prevent its subsequent use as a culture medium. The conclusion was therefore reached that satisfactory means have not as yet been found for sterilizing flour, and the author proposes to continue his observations.

Experiments on sterilizing flour with relation to panary fermentation, A. J. J. Vandevelde (*Acad. Roy. Belg., Bul. Cl. Sci., 1910, No. 7, pp. 532, 533*).—A summary of the investigation noted above.

Flour used to prevent bread from sticking to the oven, K. Mohs and C. Güttler (*Ztschr. Gesam. Getreidew., 3 (1911), No. 1, pp. 7–12*).—The composition, physical properties, and usefulness were studied of several sorts of materials, such as are used to sprinkle on the floors of bakers' ovens to prevent bread from sticking or burning. The materials consisted of finely ground wood, oat hulls, rice hulls, leaves, and similar substances. The authors point out that these goods must be kept dry as they readily become moldy.

"Narras," an important native foodstuff in German Southwest Africa, C. Grimme (*Tropenpflanzer, 14 (1910), No. 6, pp. 297–302; abs. in Chem. Zentbl., 1911, I, No. 1, pp. 32, 33; Umschau, 15 (1911), No. 11, pp. 224–226, figs. 2*).—Analyses are given of preparations made from the fruit and seed of a cucurbit (*Acanthosicyus horrida*). A light yellow oil of mild flavor, it is stated, is prepared from the seed.

Principles in jelly making, Nellie E. Goldthwaite (*Univ. Ill. Bul., 8 (1911), No. 7, pp. 19, pl. 1*).—Jelly making with a variety of fruits is discussed on the basis of experiments previously reported (E. S. R., 24, p. 363).

Some of the author's conclusions follow:

"Fruit juice to be used for jelly making must contain pectin. It must also be acidic. Juices, which are to be used for jelly making, should be cooked out of the fruit. The most common cause of failure in jelly making is an overproportion of sugar to juice, i. e., to the pectin in the juice. A short, quick test in jelly making is preferable to a test which involves a waste of time.

"There need be no 'second' quality of jelly. All may be of first quality if the juice is properly extracted and handled.

"Experiments, so far, indicate that the mean boiling process in jelly making is preferable to the long boiling, or to the short boiling process. Any given juice, when once the boiling is begun, should be transformed into jelly as rapidly as possible. The time necessary for the boiling of a quantity of jelly apparently varies with several factors: The proportion of sugar to juice, the proportion of pectin in the juice, and possibly too with the acidity of the juice. The hot jellies should be poured at once into hot sterilized glasses, and after havnig 'set,' should be carefully sealed.

"Jellies from but slightly acid fruits may be made by adding a vegetable acid to the juice, but this process is not recommended except in the case of sweet apple or quince juices. Cherry and strawberry jellies are possibilities if the hot mass is boiled somewhat beyond the first jelly test observed. The white inner skins of oranges and of lemons are prolific sources of pectin. Hence genuine jellies from these fruits may be made. The pectin from these skins may also be used for strengthening other fruit juices. . . . Blueberries are recommended as an excellent fruit for jelly making.

"Beet sugar and cane sugar may be used interchangeably in jelly making."

Table jellies, W. W. O. Beveridge (*Jour. Roy. Army Med. Corps, 16 (1911), No. 1, pp. 1–8*).—The observations and experimental data reported have to do particularly with gelatin goods such as bottled jellies, cakes or tablets, and granulated powder for jelly making, calf's foot jelly, and meat jellies.

With respect to the prevalent idea that jelly made from calves' feet is superior to that obtained from other sources, the author points out that such jelly contains "nearly always some native protein, that is, albumin and globulin." He believes that tryptophane is frequently present, as well as traces of phenol compounds, and in support of this opinion reports some data regarding the examination of calf's foot jelly in comparison with jelly obtained from granulated jelly powder and pure gelatin.

Samples of granulated jelly powders were found to contain on an average from 13 to 17 per cent gelatin, about 80 per cent sugar, from 1.5 to 2.5 per cent tartaric or citric acid, and certain flavoring and coloring matters.

To insure transparency in such jellies the water added should be below 90° C. in temperature. The jellies may be strained through muslin if necessary.

Various questions concerned with jelly and jelly making are discussed, particularly meat jellies.

Quotations from the author's discussion follow:

"A table jelly [made with gelatin, such as is often used for dessert] consists of water, gelatin, sugar, fruit essence, and a vegetable acid. As the essential part of a jelly other than sugar is gelatin it will only be necessary to consider this from a chemical and physiological point of view. . . .

" By continuous boiling with water gelatin is converted into a nongelatinizing form called β-gluten, and this reaction may partly account for the fact that some jellies will not set under any ordinary conditions. In the same way repeated heating and cooling destroys the property of gelatinizing, and the power to form a jelly is entirely lost by heating under increased pressure to 140° C.

"Aqueous solutions of the salts of monobasic acids, except alkali formates and acetates, retard the coagulation of gelatin, while salts of the dibasic and tribasic acids, polyhydric alcohols, and sugars increase the rate of coagulation. Crystalloids which increase the viscosity of water increase the viscosity of colloidal solutions. . . .

" Gelatin has one great advantage—that it is easily digested in the stomach, and also has the power of fixing excess of acidity; thus it can well be prescribed in certain disorders of the gastric digestion. In the first stage of digestion it loses its property of gelatinizing, and is formed into gelatin proteoses, gelatose, and gelatin peptones. . . .

" What little nutritive value table jellies contain is dependent more upon the sugar, amounting to from 50 to 80 per cent, than upon the small amount of gelatin present. The gelatin usually amounts in most table jellies to from 13 to 17 per cent, hence as protein sparers in certain ailments their usefulness is somewhat restricted, and there is no reason to suppose that gelatin is converted into protein within the body. As a source of heat and energy it has decided value, for 1 gm. yields nearly as much of these as 1 gm. of protein or carbohydrate—namely, 4.1 calories. Ordinary gelatin produces 1,570 calories per pound."

The author describes the method which he follows in the examination of materials containing gelatin.

Lacto—a new and healthful frozen dairy product, M. MORTENSEN and J. GORDON (*Iowa Sta. Bul. 118, pp. 268–279, charts 2*).—The authors have obtained favorable results in a study of the preparation of a frozen product of the same consistency as ice cream, made from fermented milk, to which eggs, sugar, and flavoring material have been added.

It is stated that even when buttermilk of good quality has been used it has not been possible to produce a combination of flavors which was entirely palatable. On the other hand, when milk soured with a commercial lactic-acid culture was used the product, for which the name "lacto" is proposed, was found to be satisfactory.

Directions are given for souring the milk which, when ready for use, has an acid content of from 0.7 to 0.8 per cent expressed in terms of lactic acid. The milk must be "of a mild and clean acid flavor. The curd must be thoroughly broken up. This is accomplished by pouring it from one pail to another until it is as smooth and velvety as rich cream."

Studies of the bacterial content of "lacto" showed that the lactic-acid bacteria remain alive for some time after the product is frozen but that there is no further bacterial growth or production of acid. The number of lactic-acid bacteria decreases gradually after freezing and the decrease grows more pronounced toward the end of the storage period. As regards the effects of the flavoring materials used, it was found that orange and pineapple flavoring appeared to reduce the number of bacteria, their action being probably only indirect, ascribable to the fact that such materials increased the acidity of the sour-milk mixture.

Formulas are given for making "lacto" of different sorts, the suggested flavoring material in most cases being fruit juices.

The authors discuss the possible favorable action of the lactic-acid bacteria in diminishing intestinal putrefaction.

Extended tests showed that "lacto" was generally relished.

The use of homogenized butter and skim milk in the manufacture of ice cream (*U. S. Dept. Agr., Food Insp. Decision 132, p. 1*).—The Board of Food and Drug Inspection is of the opinion that mixtures of skim milk and butter fat, when homogenized, are not entitled to the name of "milk" or "cream" and that the product made from a homogenized butter or skim milk can not be properly called "ice cream."

Cocoa and chocolate—a short history of their production and use (*Dorchester, Mass., 1910, pp. 69, pls. 5, figs. 60*).—Historical, botanical, and descriptive material is presented as well as a description of the various processes followed in preparing chocolate and cocoa for the market. A brief paper entitled Suggestions Relative to the Cooking of Chocolate and Cocoa, by Ellen H. Richards, is also included.

Tomato catsup and food inspection, R. O. BROOKS (*Spice Mill, 34 (1911), No. 3, pp. 202, 203*).—A critical discussion of data reported by the Connecticut State Station (E. S. R., 24, p. 565), with suggested standard limits for catsup made from whole tomato pulp only.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 133, p. 1*).—This decision has to do with the coloring of green citrus fruits by holding them in a warm, moist atmosphere for a short period of time after removing from the tree.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 768–769, pp. 2 each; 770–772, p. 1 each; 773–774, pp. 2 each; 775, p. 1; 776–777, pp. 2 each; 778, p. 1; 779, pp. 2; 780, p. 1; 781–785, pp. 2 each; 789, p. 1; 790–792, pp. 2 each; 793, p. 1; 795–797, pp. 2 each; 799, pp. 3; 800, pp. 14; 801, p. 1; 802–805, pp. 2 each*).—These notices of judgment have to do with the adulteration of tomato catsup, frozen eggs, shucked oysters, a food product (Maclaren's imperial cheese), flour, tomato pulp, tomato paste, and spiced catsup; the misbranding of drug products, Geneva gin, coffee, vanilla flavor and lemon flavor, macaroni, salt fish, olive oil, and table sirup; and the adulteration and misbranding of a lemon-extract compound, peppermint extract, "Prime Italian Codfish," drug products, "Red Seal Cola Queen Sirup," apple phosphate, and maple sirup.

Enforcement of the food and drugs act for the years 1908 and 1909, R. M. ALLEN (*Kentucky Sta. Food and Drugs Rpt. 1908–9, pp. 29*).—The work carried on in the State under the food and drugs act is described, and prevailing conditions and other food topics discussed. It is stated that during the period covered by the report 8,410 samples of food and drugs, taken from markets throughout the State, have been analyzed, of which 1,004 were found to be adulterated and misbranded, together with 740 miscellaneous and unofficial samples, taken for study or submitted by consumers. The work of inspection of the sanitary condition of factories, grocery stores, bakeries, etc., has been extended.

Food and drug inspection (*Ann. Rpt. Bd. Health Mass., 41 (1909), pp. 425–440*).—This is a summary of data concerning the activities of the department along this line during the year ended November 30, 1909. The total number of examinations of food and drugs was 7,337. Of these 5,796 were found to be of good quality.

Report of the analyst, H. C. LYTHGOE (*Ann. Rpt. Bd. Health Mass., 41 (1909), pp. 441–480, dgms. 2*).—Details are given regarding the examination of milk and milk products, flavoring extracts, jams, jellies, table sauces, and other food products, and of drugs.

First annual report of the department of food and drugs inspection for the year ending December 31, 1910, S. C. DINSMORE (*Nevada Sta. Bul. 74, pp. 68*).—Data are reported of the examination under the state pure food law of a large number of samples of dairy products, milk, ice cream, ice cream cones, vinegar, flavoring extracts, jams, jellies, beverages, and miscellaneous food materials.

Various food inspection decisions are quoted, Circulars 2 11 reprinted, and pure food topics discussed.

Experiments on artificial refrigeration in Danish agricultural technology. N. STEENBERG ET AL. (*1. Cong. Internat. Froid, [Paris], Rap. et Commun., 1908, III, pp. 576–589, dgms. 4*).—The experiments reported have to do with refrigeration in connection with the storage and shipment of agricultural products, particularly butter and meat.

Imports of refrigerated food products of the United Kingdom, 1880–1907, T. CRITCHELL (*1. Cong. Internat. Froid, [Paris], Rap. et Commun., 1908, III, pp. 299–327*).—Statistical and other similar data are summarized.

The value of refrigeration in the food supply of the poorer classes, P. B. PROCTOR (*1. Cong. Internat. Froid, [Paris], Rap. et Commun., 1908, III, pp. 927–931*).—The effect of refrigerated produce on market values and similar questions are considered.

[Food, diet, and agriculture in Tibet], S. HEDIN (In *Trans-Himalaya—Discoveries and Adventures in Tibet. New York, 1909, vols. 1, pp. XXIII+436, pls. 117; 2, pp. XVII+439, pls. 95, maps 3*).—The author records much information regarding the food habits and customs and the food supply of the Tibetan nomads and dwellers in towns and in the monasteries, and also gives data regarding the agriculture and agricultural resources of the country.

Flocks and herds of sheep, yaks, goats, and horses represent the chief wealth of the Tibetan nomads, while in localities where agriculture is possible many of the inhabitants cultivate the soil, barley and other grains, peas, vegetables, and fruits being grown. Milk, meat, rice, parched barley, and tea stirred up with butter are staple foods of the people as a whole.

Digestion and nutrition, G. H. ROGER (*Digestion et Nutrition. Paris, 1910, pp. XIV+624*).—In this extended handbook such subjects are considered as the general properties of ferments; ferment action; distribution and preparation of ferments; proferments, ferments, coferments, and antiferments; digestion of carbohydrates; glycosuria; metabolism of fat (obesity); proteid digestion; proteid putrefaction; and body secretions and their rôle in nutrition. As a whole the volume constitutes a digest of data regarding digestion and its relation to general nutrition.

A study of the internal function of the pancrease in carbohydrate metabolism, J. H. PRATT and L. H. SPOONER (*Trans. Assoc. Amer. Physicians, 25 (1910), pp. 614–635*).—According to the conclusions reached there is a rapid decrease in the power to assimilate glucose after the onset of atrophy of the pancreas. The persistence of a low limit of assimilation for more than a year, which was noted in the data reported, shows, according to the authors, that the other organs of the body compensated imperfectly, if at all, for the pancreatic insufficiency. The limit of assimilation in a dog with atrophy of the pancreas, which had been under observation 14 months, was increased more than 100 per cent by feeding fresh pancreas. The data are also considered from the standpoint of diabetics.

The paper is followed by a discussion.

The influence of water on gastric secretion and the chemical affinity of mucus for hydrochloric acid in the stomach, N. B. FOSTER and A. V. S. LAMBERT (*Proc. Soc. Expt. Biol. and Med.*, *4* (*1906*), *No. 1*, *p. 13*).—Dogs with Pawlow fistules were used as subjects in the authors' experiments, which are briefly summarized:

"It was observed that with definite amounts of cracker meal as food, the amount and rate of gastric secretion depend to some extent on the amount of water given the dog with his meal, i. e., when small amounts of water are given, the secretion is slow and scanty. If larger quantities of water are mixed in the food the secretion is more abundant.

"The degree of acidity of gastric juice depends upon the amount of secretion. When this is considerable it is much more acid than when the secretion is scanty. Pawlow is of the opinion that the degree of acidity of the gastric juice is constant; this can hardly be correct, however, for the total acidity changes from hour to hour. The proportion of free acid depends upon the amount of mucus secreted, since mucus protein like other proteins combines with HCl. Mucus in the presence of pepsin combines with HCl to a considerable extent and undergoes digestion, with formation of proteoses."

Concerning the ash content of an unrestricted diet, R. TIGERSTEDT (*Skand. Arch. Physiol.*, *24* (*1910*), *No. 2–4*, *pp. 97–112*).—The author reports determinations of the ash content of the food materials in the dietaries of Finns reported by Sundström (E. S. R., 24, p. 171).

According to his summary, the amount of phosphorus assumed to suffice for equilibrium is from 2.0 to 3.5 gm. per day. The average amount found in the diet of the men included in the study was 4.33 and in the diet of the women 2.77 gm. In the case of individuals with average muscular work, the diet supplied on an average 3.57 gm. per day. In the case of calcium, the diet of the men supplied 3.79 and that of the women 2.29 gm., or 2.87 gm. for a moderate work ration having an energy value of from 3,000 to 3,500 calories. The assumed average amount of calcium required per day, it is pointed out, is not greated than 1 gm. The amount of magnesium considered necessary for equilibrium is not far from 0.5 gm. per day. In the dietary studies, the diet of the men supplied 1.09 and that of the women 0.66 gm., with an average of 0.92 gm. for the diet for a man at moderate work.

According to the author, it should be assumed that, as is the case with nitrogen, equilibrium can be obtained with different quantities of ash constituents, and the amount required for maintaining equilibrium is not constant but probably varies within wide limits. That this is the case is indicated by the variations observed in individual cases. The difference between the total ash of the diet and the sum of the amounts of phosphoric acid, calcium oxid, and magnesium oxid may be assumed to consist chiefly of sodium chlorid. If this is the case, the dietary of the men studied would supply on an average 42 gm. per day and that of the women 28 gm. The ratio of the mineral constituents to each other and similar questions are discussed. It is pointed out by the author that the fairly large amount of phosphorus, calcium, and magnesium in these dietaries in comparison with American dietaries is probably due to the large amounts of milk which were consumed.

Sodium chlorid and potassium salts, E. BIERNACKI (*Ztschr. Expt. Path. u. Ther., 8 (1911), No. 3, pp. 685–694*).—The author reports and discusses experiments which have to do with his theory regarding the relation between sodium chlorid and potassium metabolism (E. S. R., 24, p. 172).

The pathogenesis of pellagra, H. RAUBITSCHEK (*Wiener Klin. Wchnschr., (1910), No. 26, pp. 963–965*).—The results are presented of an experimental study of the effects of exposure to sunlight upon maize-fed animals with reference to a possible relation to the etiology of pellagra (see below).

Concerning the pathogenesis of pellagra, H. RAUBITSCHEK (*Centbl. Bakt. [etc.], 1. Abt., Orig., 57 (1911), No. 3, pp. 193–208*).—Experiments are reported on the effects of an alcoholic extract of maize when fed to animals exposed to sunlight (see below).

Pellagra and its possible relation to maize according to some recent views, C. H. LAVINDER (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 26 (1911), No. 8, pp. 199–208*).—A digest of data is presented particularly of investigations by Raubitschek (see above), which have to do with the effects of sunlight upon animals fed Indian corn in association with the question of a possible relation to the etiology of pellagra, the work being a contribution to the study of the wholesomeness of corn as food. The data presented concern the possible relation between pellagra and the occurrence of a photodynamic substance in Indian corn.

In general, the author cited believes that he has demonstrated the presence of such material in corn. An alcohol-soluble substance of this character was isolated from maize and its effects studied in experiments with animals. From his experiments Raubitschek concludes that "a diet of maize (good or bad), when administered under the influence of sunlight, is deleterious to white mice, and that in this we have relations closely analogous to what is seen in fagopyrismus," and further that "by alcoholic extraction of maize meal (removal of fat) the active body is removed, and hence for this reason extracted polenta, free of fat and color stuffs, even under the influence of sunlight, is not directly harmful as a food."

He states further that he does not attempt to bring his experimental results into a strict relation with the etiology of pellagra or to assume for it a photodynamic basis, or even to conclude that this disease is produced by an almost exclusive diet of maize, good or bad, which displays its harmful effects first under the influence of light. It is pointed out that the results are to be considered as very suggestive but not yet conclusive.

The distribution of extractives in mammalian muscles, O. VON FÜRTH and C. SCHWARZ (*Boichem. Ztschr., 30 (1911), No. 6, pp. 413–432*).—Horse and dog flesh were used in the investigations reported as to the distribution of the different nitrogenous constituents in muscular tissue.

In a comparison of normal and fatigued muscle the authors did not observe any marked variation from the usual distribution of such constituents. In general, they conclude that creatin and especially carnosin are the most abundant of muscle extractives. The desirability of further physiological studies of carnosin is pointed out.

The relation of brain phosphatids to tissue metabolites, W. KOCH and W. W. WILLIAMS (*Jour. Pharmacol. and Expt. Ther., 2 (1910), No. 3, pp. 253–264*).—According to the authors, the observation that the accumulation of potassium in the cell can be more satisfactorily explained by the fact that it is combined with kephalin, than on the theory of any hypothetical semipermeable membrane, should be capable of extension to tissue metabolites. The tendency of a tissue metabolite to accumulate in and also to be eliminated from the cell in which it has been manufactured; "its ability when eliminated from the first cell to enter into and accumulate in other cells or to be immediately excreted through the kidney, no doubt bears some relation to its power of combination with tissue colloids. . . . Specific chemical affinities very probably play a rôle and the present investigation was undertaken to determine to what extent the phosphatids possess the power of combining with products of tissue metabolism."

Some of the conclusions follow, which were drawn from experiments with substances which may be regarded as of food value to the tissues, including amino acids, glycocoll, and glucose, and with substances having a characteristic physiological action, including among others adrenalin, caffein, and theobromin:

"The changes in state of aggregation of lecithin produced by sodium chlorid are the result of the independent action of the sodium and chlorin ions, whose effects are in opposite directions. Below the concentration of a physiological salt solution (0.12 molecular) the action of the chlorin ion, which decreases the state of aggregation of the lecithin, predominates. Above the concentration of a physiological salt solution, the action of the sodium ion, which tends to increase the state of aggregation of lecithin, comes more and more into prominence.

"It has been suggested that, when the phenomenon of chlorid retention occurs, some change has taken place in the state of aggregation of the cell lipoids which allows this action of the chlorin ion to predominate to a still greater extent.

"Ammonia and bile salts possess the power of altering the physical state of aggregation of lecithin to such an extent as to permit of the conclusion that they can be of functional significance in altering the permeability of cell membranes. . . .

"The ability of the tissue metabolites to combine with lecithin, as measured by the changes in the physical state of aggregation produced by their presence, is in some cases considerable, in other cases entirely lacking. Thus hypoxanthin, creatin, creatinin, adrenalin, and ammonia salts show evidence of combination. Inosit is doubtful and urea is negative.

"The amino acids show varying powers of combination. The dicarboxyacids, like acids in general, tend to increase the state of aggregation of lecithin."

The relation between surface area and respiratory exchange, H. Kettner (*Die Beziehungen der Korperoberfläche zum Respiratorischen Gaswechsel. Inaug. Diss., Univ. Bern, 1909, pp. 30, pls. 2, fig. 1*).—According to the author's investigations, which were made with young and with older guinea pigs, total carbon dioxid production increases with increased body weight and increased surface area, differences being very much greater when expressed on the percentage basis per unit of body weight. The experimental data reported are discussed in relation to theories of nutrition.

ANIMAL PRODUCTION.

The mineral nutrients in blue grass, E. B. Forbes, A. C. Whittier, and R. C. Collison (*Ohio Sta. Bul. 222, pp. 39–53*).—A study of the nutritive value of the mineral constituents of blue grass (*Poa pratensis*), with special reference to the content of phosphorus and the chemical condition in which it is present.

Blue grass from different localities varied greatly in its content of mineral elements, some pastures in Ohio containing twice as much mineral nutriment as others. Samples at all stages of growth from Ohio and Kentucky varied in calcium between 0.135 and 0.424 per cent, in potassium between 1.41 and 2.43 per cent, and in total ash between 4.8 and 8.32 per cent. "Those samples which were richest in phosphorus were from pastures which were heavily fertilized by the excreta of animals grazing upon them. In one such pasture the grass contained 0.403 per cent of phosphorus, on a dry-matter basis, while on a thin clay hilltop the grass contained only 0.104 per cent of phosphorus. The organic phosphorus content of these grasses was generally highest where the total phosphorus was highest, and where the grass had been heavily fertilized. The next to the highest figure of all for organic phosphorus accompanies a medium total phosphorus content in a field of grass which had been twice fertilized with a complete commercial fertilizer. . . . Thus we may conclude that the organic phosphorus may be increased by manuring and the use of complete fertilizers, but not to so great an extent as the inorganic phosphorus."

The analyses of blue grass grown on experimental plats showed: "(1) That the grass fertilized with sodium phosphate contained more phosphorus than any other; (2) that the grass fertilized with potassium chlorid contained more potassium than any other; (3) that the grass fertilized with lime contained more calcium than any other; (4) that the grass fertilized with a mixture of the three compounds contained more ash than any other grass; (5) that the excess of phosphorus in the grass fertilized with sodium phosphate over that present in the unfertilized grass was all in an inorganic condition; that is, the addition of sodium phosphate to the soil did not increase the percentage of phosphorus-containing proteins in the blue grass; (6) that the use of the phosphate as a fertilizer appeared to increase the potassium in the grass, and conversely the use of the potassium salt as a fertilizer increased the phosphorus in grass; (7) that the use of lime was without noticeable effect on either the potassium or the phosphorus in the grass; and (8) that the addition of potassium chlorid to the soil increased to a marked extent the organic phosphorus of the grass, while sodium phosphate and lime were without effect on this constituent."

Analyses showed that the phosphorus was higher in the plants grown with an abundance of water than in those grown in a dry place. It is stated that this may have been only a coincidence and a further study is necessary on this point. To further test the effect of moisture, oat plants were grown in pots in greenhouse, and the following results were obtained from an analysis of plants cut at various times: "The percentages of moisture, ash, and phosphorus in the oat plant vary in an orderly way according to the amount of moisture available during growth. The nature of the effect of increased soil mixture depends, in a measure, on the stage of growth of the plant. In the early stages of growth of oats increased moisture increases to a slight extent the percentages of moisture and phosphorus in the plant."

Canadian blue grass (*P. compressa*) was found to be somewhat more woody than the common blue grass. It was richer in potassium but less so in nitrogen, calcium, and phosphorus, and is probably not so valuable a feed.

Some practical conclusions drawn from this work are the following: "It seems likely that the organic phosphorus in blue grass is present in sufficient amount to sustain normal growth of animals, but the need for inorganic phosphorus is much greater, and on infertile pastures we may be able to grow better bone, at least, by feeding calcium phosphate. Calcium phosphate may be fed ad libitum, mixed with salt, or it may be fed mixed with the ration. It may also be indirectly administered by using on the pastures fertilizers containing calcium and phosphorus. For growing or milk-giving animals we would give about ½ lb. of bone flour per 100 lbs. of air-dry feed."

Indian cane as a fodder and stand-by, A. H. HAYWOOD (*Agr. Gaz. N. S. Wales, 22 (1911), No. 1, pp. 79–81, fig. 1*).—This includes favorable comments by stock farmers concerning the use of Indian cane as a fodder plant in Australia. An analysis of the cane grown on the volcanic soil of the Grafton experiment farm, made by F. B. Guthrie, is as follows: Moisture 69.60, albuminoids 2.25, ether extract 0.19, carbohydrates 10.08, fiber 6.84, and ash 11.04 per cent.

The feeding value of mangels, T. B. WOOD (*Proc. Cambridge Phil. Soc., 16 (1910), No. 1, pp. 42, 43*).—After studying the data of feeding trials which included about 400 animals, A. B. Bruce found that the probable error in the case of 1 animal amounted to 14 per cent of the average increase in weight during the feeding period. From this it is concluded that it is necessary to make comparative tests with at least 25 animals, each receiving the same ration, in order to be able to get a really significant result.

One hundred or more varieties of mangels were reduced to 5 types, namely, the White Fleshed Globe, Intermediate, Golden Tankard, Golden Globe, and Long Red. The latter yielded 3.9 tons of dry matter per acre, or more than half a ton per acre more than any of the other types.

Feeding experiments were made by Professor Middleton in order to ascertain the feeding value of these types of mangels in proportion to their content of dry matter. In a series of 7 trials 2 lots were fed side by side on rations containing equal amounts of cotton or linseed cake and chaff, but 1 lot received the White Fleshed Globe mangels and the other an equal quantity of Long Reds. It was found that the increases in live weight were in the proportion of 100:110±4 in favor of the Long Red. By using 90 animals the probable error was brought inside the difference which was under measurement. The difference found being 4 times the probable error of the experiment, it is therefore concluded that there is probably at least 10 per cent in real difference in feeding value in favor of the Long Reds.

Two other trials in which the Golden Tankard and Long Red were compared, each containing equal percentages of dry matter, were found to be well inside the probable error. "The result of 2 sets of trials is to make it practically certain that the percentage of dry matter in mangels may be taken as an index of their feeding value."

[Notes on protein hydrolysis in feeding stuffs], F. W. FOREMAN (*Proc. Cambridge Phil. Soc., 16 (1910), No. 1, pp. 87, 88*).—It is suggested that considerable economy might be effected by purchasing feeding stuffs the proteins of which were known to be rich in the groups in which the proteins of home grown feeds are deficient. In order to accomplish this it is necessary to ascertain the nature of the proteins in the commercial feeding stuffs.

The author submits a preliminary report on the proteins of linseed, which were determined by hydrolysis of the crude protein. The results are as follows: Alanin 1.03, valin 12.71, leucin and isoleucin 3.97, prolin 2.85, phenylalanin 4.14, aspartic acid 1.65, glutaminic acid 11.58, tyrosin 0.65, arginin 6.06, histidin 1.66, lysin 1.19, ammonia 1.94 per cent. Glycin, serin, and tryptophan were also present but not in measurable quantities. It is thought that the low tyrosin content may be due to the method used. The customary method is considered unsatisfactory, and the subject is to be further investigated.

Condimental feeds, stock and poultry tonics and conditioners, G. M. MACNIDER (*Bul. N. C. Dept. Agr., Jan., 1911, Sup., pp. 38*).—Analyses are given of a large number of condimental feeds for stock and poultry, together with the text of the state law in regard to these feeds.

Inspection of commercial feed stuffs, P. H. SMITH ET AL. (*Massachusetts Sta. Bul. 136, pp. 3–56*).—This bulletin reports analyses of commercial feeding stuffs, and presents a discussion as to their relative values, calling attention to desirable and undesirable feeding stuffs for Massachusetts conditions. Among other matters of interest to the purchaser of feeding stuffs is a tabulated list of the wholesale cost of feeding stuffs for the year 1910.

The analyses include cotton-seed meal, linseed meal, gluten feed, distillers' dried grains, malt sprouts, brewers' dried grains, wheat middlings, wheat mixed feed, wheat bran, rye feeds, calf meal, corn meal, molasses feeds, ground oats, rye meal, hominy meal, provender, fortified starchy feeds, corn bran, dried-beet pulp, meat scrap, bone meal, cut clover, alfalfa meal, and proprietary mixed feeds.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 786, p. 1; 794, pp. 3; 798, p. 1*).—These relate to the misbranding of stock feed and the adulteration and misbranding of cotton-seed meal.

Profitable stock raising, C. A. SHAMEL (*New York, 1911, pp. IX+274, pls. 7, figs. 21*).—This book treats of the profitable types of all classes of live stock, and discusses the broad problems involved in the live stock industry.

Our live stock in 1910, M. VACHER (*Bul. Soc. Nat. Agr. France, 71 (1911), No. 2, pp. 161–182*).—A statistical account of farm animals and meat products in France.

[Live stock in East Friesland], WEGNER ET AL. (*Deut. Landw. Tierzucht, 15 (1911), No. 10, pp. 109–123, figs. 20*).—A series of articles by different authors and a report on the present condition of the live stock industry, together with a discussion of some influences at work for the improvement of the different kinds of farm animals in East Friesland.

The breeds of the most important domesticated animals in Africa, D. KÜRCHHOFF (*Tropenpflanzer, 11 (1907), No. 8, pp. 550–559; 12 (1908), Nos. 3, pp. 129–135; 7, pp. 328–335; 11, pp. 524–531; 13 (1909), No. 5, pp. 222–228; 14 (1910), No. 6, pp. 302–308*).—The characteristics of the native breeds of horses, cattle, sheep, and swine are described. Considerable historical matter is included, as well as methods of feeding and managing as practiced in the different countries. There are numerous references to the literature.

Transportation of domesticated animals by water, J. ZINKE (*Der Transport von Haustieren zur See. Inaug. Diss., Univ. Bern, 1910, pp. 89*).—This contains an outline of the history of ocean transportation of animals, and discusses the construction and equipment of vessels and the loading, feeding, and treatment of animals during transport.

A bibliography is appended.

The identification of animals by branding and otherwise, P. A. FISH (*N. Y. State Vet. Col. Circ. 2, pp. 16*).—Comments on different methods of branding and the effect on hides.

Some modern large foreign abattoirs, H. MARTEL (*Hyg. Viande et Lait, 4 (1910), Nos. 11, pp. 577–600, figs. 5; 12, pp. 646–665, figs. 5; 5 (1911), Nos. 1, pp. 16–23, fig. 1; 2, pp. 87–96; fig. 1*).—The plans and equipment of large abattoirs in Dresden, Zurich, Vienna, and Stuttgart are illustrated and described, with special reference to sanitary condition.

The bamboo wattle silo, B. COVENTRY (*Agr. Jour. India, 6 (1911), No. 1, pp. 20–26, pls. 6*).—A silo constructed of bamboo wattle, covered on the side with a plastering of mud and provided with a light roof of thatch, is illustrated and described.

The Lincolnshire red Shorthorn breed of cattle, G. E. COLLINS (*Rhodesia Agr. Jour., 8 (1911), No. 3, pp. 398–403, pls. 4*).—A general account of the characteristics of this breed and its adaptability for South African conditions, as judged by the importations which have already been made.

The Odenwälder cattle, Dünkelberg (*Deut. Landw. Tierzucht, 15 (1911), No. 11, pp. 125–128, figs. 4*).—The value of this breed of cattle is pointed out, and the methods of management in its native district are discussed.

Cattle breeders' associations in Denmark, F. Rasmussen (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 129, pp. 40, pls. 2*).—This contains a brief history of the Danish cattle industry and the plan and organization of cattle breeders' associations, with special reference to their usefulness to the dairy industry. The method of judging bulls at shows, the market prices of bulls and conditions of transfer, and other matters of interest to dairymen are given. The appendix contains the by-laws for cattle breeders' associations under common management on the island of Funen, the law relating to institutions for the promotion of the breeding and keeping of domestic animals, and the form of contract used in the purchase of bulls.

Uniformity of growth in calves, A. Gouin and P. Andouard (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 11, pp. 445–447*).—The percentages of nitrogen and phosphoric acid retained in the body increased with the age of the calf, whereas the daily increase in weight did not change materially with the age.

Raising beef cattle in Alabama, D. T. Gray and W. F. Ward (*Alabama Col. Sta. Bul. 150, pp. 3–24, figs. 5*).—This is a discussion of the advantages of the South as a beef-producing region, and a report of a test made by the station in cooperation with the Bureau of Animal Industry of this Department to test the cost of raising grade Angus steers to the feed-lot period under southern conditions. During the summer months no feed was given in addition to the pasture, which consisted principally of white clover, Bermuda, and Lespedeza. In addition to the winter range, hay and cotton seed were fed. The hay consisted of a mixture of sorghum, crab grass, Johnson grass, and cowpeas, and was not of good quality. Green sorghum was used for several days at one time to supplement a short pasture.

During the summer the calves made an average daily gain of 1.24 lbs. each, the yearlings 1.22 lbs. each, while with the older stock the gains were not so large. During the winter the calves gained 0.29 lb. per day, while the yearlings and older stock lost in weight. "An average of the whole year shows that the calves made a daily gain of 0.77 lb. or a total gain of 276 lbs. per head. The yearlings made a daily gain of 0.564 lb. per head, or a total of 203 lbs. for the 12 months. A gain of 170 lbs. per head, or a daily gain of 0.47 lb., was made by the cattle while they were increasing from 24 months to 30 months in age, while 136 lbs., or 0.4 lb. per head per day, was made by the animals while they were increasing in age from 24 to 33 months."

The cost per hundredweight of raising a steer, when the manure received no credit, was estimated as follows: To 12 months of age $5.07, to 24 months of age $4.84, to 30 months of age $4.95, and to 33 months of age $4.90. It is stated that these gains might be made cheaper if the cattle had been free from ticks and a combination of clover and Bermuda pasture had been used to lengthen the pasture season.

Wintering steers in Alabama.—Fattening cattle on pasture in Alabama, D. T. Gray and W. F. Ward (*Alabama Col. Sta. Bul. 151, pp. 25–63, figs. 16*).—Continuing the work noted above, the object of the experiments reported in this bulletin was to test the methods of finishing steers after they had reached the feed-lot period. The stock used were grades containing Angus, Shorthorn, Hereford, and Red Polled blood, and many with a predominance of Jersey and scrub breeding. The summer pasture consisted of a mixture of sweet clover, Japan clover, Johnson grass, and some Bermuda. The winter range consisted of the winter corn and cotton fields.

The winter feeding was continued for 2 seasons. In the winter of 1907–8 each range steer which received no supplementary feed lost on an average 97 lbs. and in the following winter 106 lbs. in weight. The lot receiving cotton-seed meal and hulls as an additional ration lost 6 lbs. per head the first season and gained 3 lbs. per head the second season. The cost of the extra feeds for these lots was $4.70 and $5.63, respectively. With good peavine hay as a supplementary feed, at a cost of $3.57 per head, the average loss was 9 lbs. each. With cotton seed as a supplement, costing $3.23 per head, the loss was 40 lbs. per steer. With cheap hay as a supplementary feed, costing $2.60 per head, the loss was 40 lbs. each.

The steers used in the winter work, noted above, were redivided and continued for summer feeding. In 1908 the lot on pasture alone made an average daily gain of 1.52 lbs. per head, at a cost of 1.18 cts. per pound gain, dressed 49.5 per cent live weight, and made a profit per steer of $2.86. The lot receiving cotton-seed cake in addition to pasture made an average daily gain of 2.32 lbs. per head, at a cost of 2.56 cts. per pound gain, dressed 53.8 per cent live weight, and made an average profit per steer of $10.42. With caddo cake (cold-pressed cotton-seed cake) as a supplement the average daily gain was 1.84 lbs. per head, at a cost of 3.03 cts. per pound gain, dressed 53.6 per cent live weight, and made an average profit of $6.62 per steer. A second lot of scrub stock, receiving cotton-seed cake, made an average daily gain of 1.62 lbs. per head at a cost of 3.24 cts. a pound gain, dressed 52.7 per cent live weight, and made an average profit of 43 cts. per head.

In 1909 the lot without supplementary feed made an average daily gain of 1.74 lbs. per head, at a cost of 1.03 cts. per pound gain. This lot dressed 51.8 per cent live weight, and made an average profit of $7.06 per steer. The lot receiving cotton-seed cake made an average daily gain of 1.88 lbs. per head at a cost of 3.21 cts. per pound gain, dressed 54.2 per cent live weight, and made an average profit of $6.99 per steer. A lot receiving cotton seed as a supplement to pasture made an average daily gain of 2.06 lbs. per head at a cost of 2.39 cts. per pound gain, dressed 53.9 per cent live weight, and made an average profit of $8.39 per head. Those given feed in addition to pasture lost less in transport than the rest. The extremely low profit of one lot receiving cotton-seed cake was due to the fact that they were scrubs, varying from 1 to 5 years in age.

From these tests it is apparent that it pays to supplement southern pastures with a concentrated feed when cattle are being finished for the fall market, that cotton-seed cake was superior to the cold-pressed cake, and that the whole cotton seed produced cheaper gains than the cotton-seed cake. Additional tests are promised to determine what concentrated feeds can be used to the greatest advantage.

Beef production in Alabama, D. T. Gray and W. F. Ward (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 131, pp. 47, pls. 2*).—A discussion of the advantages of the South for beef production. The experimental data reported are contained in the two bulletins noted above.

Feeding experiments with steers and hogs, J. T. Cruse (*Texas Sta. Bul. 135, pp. 25, figs. 8*).—This bulletin reports tests of rations with cotton-seed meal in connection with various supplementary feeds for steers and hogs.

Cotton-seed meal, rough red rice, and unheaded and unshredded Kafir corn was fed to 2 lots of 8 steers for 34 days, in which an average daily gain of 1.76 lbs. per head was made. Fully 50 per cent of the Kafir corn passed through undigested. The rice was fed unground and had a tendency to cause bloating and scouring. The ration was then changed to ground rough red rice, cotton-seed meal, Johnson grass hay, and corn chops. The average daily gain made on this ration for 34 days was 2.35 lbs. per head, at a cost of 8.56 cts. per pound. During the remainder of the 90-day period 4 of the steers received cold-pressed cotton-seed cake and Johnson grass hay, and made a gain of 1.25 lbs. per head and day, while the other 4 steers on cotton-seed meal and hulls gained 0.85 lb. per head and day.

Another lot of 8 steers on cotton-seed meal and Kafir corn forage for 34 days, and then on cotton-seed meal, rough red rice, and cotton-seed hulls for 56 days, made an average daily gain of 2.7 lbs. at a cost of 9.16 cts. per pound. A lot on cotton-seed meal, rough red rice, and Johnson grass hay during the entire 90 days gained 2.19 lbs. per head and day, at a cost of 12.29 cts. per pound. A ration of cotton-seed meal and hulls for 90 days produced an average daily gain per head of 2.44 lbs., at an average cost of 8.72 cts. per pound.

Block tests showed that the last lots were superior to the others in quality of meat, although the percentage of dressed weight was less. Though Kafir corn forage proved unprofitable, it is thought to be an economical feed if fed with the heads ground and the stalks shredded. When the price of Johnson grass hay is reasonably low it is recommended as a roughage for fattening steers, but none of the feeds at the prices estimated in the bulletin can economically take the place of cotton-seed meal and hulls.

The pig feeding tests were made with grade Poland-Chinas, Duroc Jerseys, and Berkshires. There were 5 lots of 10 pigs each, and the average gains per head and day were as follows: On cotton seed meal and corn chop, mixed and fermented, 1.8 lbs. at a cost of 4.56 cts. per pound; on cotton-seed meal and unground rough red rice, mixed and fermented, 1.4 lbs. at a cost of 5.74 cts. per pound; on tankage and unground rough red rice, mixed and fermented during the larger portion of the period, 1.28 lbs. at a cost of 7.6 cts. per pound; on alfalfa meal and rough red rice (most of the time ground), mixed and fermented, 1.26 lbs. at a cost of 8.08 cts. per pound; on alfalfa meal and corn chop, fermented, 1.14 lbs. at a cost of 11.02 cts. per pound.

These results show that ground rough red rice fed with cotton-seed meal is an economical ration for fattening hogs. The lots receiving most nearly the standard ration made the largest and most economical gains. At no time during the experiments was there any injurious effects from feeding cotton-seed meal.

Pig feeding experiments and two kinds of hog houses, A. L. STABLER (*Maryland Sta. Bul. 150, pp. 93–132, figs. 11*).—This bulletin reports feeding tests with pigs, and describes two styles of hog houses in use at the station.

The first feeding trial was with 10 Poland-Chinas divided into 2 equal lots. One lot, on a ration of ground corn fodder, in 3 months made an average daily gain of 0.573 lb. at a cost of 6.88 cts. per pound. A lot on corn and cowpea silage ad libitum gained 0.73 lb. per head and day, at a cost of 6.51 cts. per pound. In a comparison of shelled corn and corn meal fed in connection with skim milk somewhat better gains were made than with corn meal alone, but this advantage was offset by the higher cost per pound of gain.

Comparison was made of wet, soaked, and dry feeds when the ration consisted of corn-and-cob meal, wheat middlings, and gluten meal. In a trial lasting 112 days a lot receiving the grain in the form of a thick slop by mixing with water or milk made an average daily gain per head of 0.623 lb., at a cost of 7.82 cts. per pound. When the feed was mixed and allowed to soak 24 hours before feeding, the gain per head and day was 0.789 lb., at a cost of 6.63 cts. per pound. The lot fed dry grain made an average daily gain per head of 0.713 lb., at a cost of 6.87 cts. per pound.

In another test when chopped alfalfa was added to a ration of shelled corn and wheat middlings, the gains were reduced the first part of the period but increased the latter half. In a feeding test with wheat bran substituted for one-fifth its weight of hominy chop, the value of the ration was increased, but hominy chop alone gave better results than a mixture of 3 lbs. of hominy chop and 2 lbs. of bran.

A test of hopper feeding was made, in which 5 Duroc Jerseys were allowed access at all times to corn meal, wheat bran, tankage, and linseed meal. The nutritive ratio of the voluntary ration was 1:7.3. More corn meal was eaten than all other feeds combined. The pigs ate regularly without surfeiting and produced pork economically. A patent motor grinder and feeder gave good results in 2 tests, but when used in comparison with hopper feeding with both shelled corn and corn meal the margin of profit was in favor of the hopper-fed pigs.

A tonic mixture (E. S. R., 6, p. 664), wood charcoal, and soft coal were compared as correctives and were ranked in value in the order named. The pigs fed the soft coal in large quantities had better appetites and gained more than pigs having no corrective. A hog house containing 5 pens and a portable hog cot are illustrated and described.

Cost of raising pigs, C. A. Wilson (*Wallaces' Farmer, 36 (1911), No. 12, p. 564*).—An experiment in the cost of producing and growing pigs up to the time of weaning is reported.

The average cost of maintaining the sow was $11.66, besides 15.5 cts. for maintaining the boar. The birth charge for each pig therefore varied from $11.82, when there is only one in the litter, to 74 cts. when there is a litter of 16. To these figures must be added $1.87 for the feed of the sow in order to determine the total cost to the time of weaning.

Influence on the production of mutton of manures applied to pasture, W. Somerville (*Jour. Bd. Agr. [London], 17 (1911), No. 10, Sup. 5, pp. 58, pl. 1*).—A summary of trials begun in 1896, brief reports of which have appeared from time to time (E. S. R., 15, p. 897).

Some of the conclusions drawn from the work as a whole are the following: "Cake of various sorts was fed to sheep on pasture at 11 centers, and in no instance was the outlay on the cake recovered in the increased mutton produced by the sheep in the season when the cake was consumed. . . . Common burned lime, used alone at the rate of 4 tons per acre, has proved very ineffective; but smaller dressings of ground lime, when added to a phosphatic dressing, have sometimes been justified. . . . Where a direct comparison has been made between the effects of equal quantities of phosphoric acid derived from basic slag and superphosphate respectively, the former manure has always produced the greater amount of live weight increase. When the cost of manure is taken into account, the profits from the use of basic slag have always been much greater than those from superphosphate.

"Potash added to a phosphatic dressing generally resulted in the production of more live weight increase, but this increase was not a profitable one. The expediency of using potash on pastures—as contrasted with meadows—therefore, receives no support from these experiments. The addition of moderate dressings of sulphate of ammonia or nitrate of soda to land already treated with phosphate has increased the yield of herbage, but has, as a rule, reduced the yield of mutton. . . . Dissolved bones compare badly with basic slag and superphosphate."

Fundamental facts about wool, C. S. Plumb (*Breeder's Gaz., 59 (1911), No. 14, p. 884*).—The structure of the wool fiber and the grades of wool found on the market are explained.

Hygroscopic qualities of wool (*Bul. Nat. Assoc. Wool Manfrs., 40 (1910), Nos. 2, pp. 128–151, figs. 5; 3, pp. 209–217, figs. 2; 41 (1911), No. 1, pp. 108–118, pls. 9*).—This is a discussion of the properties of wool fibers by H. Priestman and W. D. Hartshorne. Some experimental data on the textile qualities of wool fiber are reported.

On the wool track, C. E. W. Bean (*London, 1910, pp. XVII+296, pls. 8, fig. 1*).—The contents of this book were originally written as a series of articles for the *Sydney* (Australia) *Morning Herald.* The Australian wool industry from the paddock to the loom and the life of the sheep herder in the back country are depicted in a vivid style.

Phases of the wool trade (*Breeder's Gaz., 59 (1911), No. 10, p. 630*).—A consideration of some factors concerned in the process of conveying wool from the shearing pen to the buyer of woolen goods, in which it is pointed out that the system of distribution is expensive and burdensome alike to grower and consumer.

The need of more wool (*Bul. Nat. Assoc. Wool Manfrs., 40 (1910), No. 1, pp. 11–23*).—An editorial containing statistical data on the production and consumption of wool in the United States. The opportunities for wool growing, especially in New England and on the western ranges, are pointed out.

The evolution of a breed (*Live Stock Jour.* [*London*], *73 (1911), No. 1928, p. 270*).—This refers to the new breed known as Polo pony, which has been brought about by crossing the Thoroughbred with several kinds of ponies. In 12 years' time a type has been produced which combines in a remarkable degree the height and hardiness of the pony with the speed and stamina of the Thoroughbred, and which apparently breeds fairly true to type.

Iceland horses, Becker (*Landw. Umschau, 1910, No. 46, pp. 1134, 1135; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 312*).—A note on the increase in the use of Iceland horses in Denmark, where they have proved to be excellent farm horses, being both hardy and resistant to disease. There are about 45,000 horses in Iceland, and from 3,000 to 4,000 are exported yearly to Denmark, England, and Scotland.

The stud farms of Bàbolna, Nemeth (*Rev. Hongrie, 1910, No. 5; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 312*).—An account of the work of the Hungarian Department of Agriculture in encouraging horse breeding by maintaining a large number of purebred stallions, one-fifth of which are Arabs.

Growth measurement of horses, F. Schöttler (*Wachstumsmessungen an Pferden. Inaug. Diss., Univ. Bern, 1910, pp. 45*).—Noted from another source (E. S. R., 24, p. 376).

[Stallion regulation] (*Jour. Bd. Agr.* [*London*], *17 (1911), No. 12, pp. 1020, 1027*).—This contains the regulations of the Board of Agriculture and Fisheries of Great Britain for the registration and service of stallions.

Recommendations regarding stallion laws (*Breeder's Gaz., 59 (1911), No. 8, p. 497*).—These recommendations, which were adopted by the executive committee of the National Society of Record Associations, are suggested for those States where there is a desire to amend existing laws or to formulate new laws concerning the registration of stallions.

Horses and riding, E. L. Anderson (*Fort Leavenworth, Kans. 1909, pp. 68, pl. 1, figs. 40*).—This contains instructions for riding and training horses, with a brief description of breeds of horses best suited for the saddle.

Harness, harness fitting and repairing, A. H. E. McDonald (*Agr. Gaz. N. S. Wales, 21 (1910), Nos. 11, pp. 947–953; 12, pp. 1028–1035; 22 (1911), No. 1, pp. 39–47, figs. 26*).—This series of articles, which was prepared for the use of farmers, treats of the troubles caused by ill-fitting harness, the uses of the different parts, and the care and repair of the harness and other horse trappings.

Laboratory outlines for the study of the embryology of the chick and the pig, F. R. Lillie (*Chicago, 1906, 2. ed., pp. 50*).—The methods of study employed in these outlines are (1) a study of the living embryo, (2) a study of the entire embryo as an opaque object with a dissecting microscope and with the compound microscope, after killing, hardening, staining, clearing and mounting, (3) a study of embryos by dissection, and (4) studies of serial sections by the microscope.

The transformations in the fats in the hen's egg during development, Elizabeth C. Eaves (*Jour. Physiol., 40 (1910), No. 6, pp. 451-453*).—The increase of fat in a chick was not as rapid as the decrease of fat in the yolk. The iodin values showed that there was a change in the composition of the fat, and presumably the oxidized fat was used to furnish energy for the growing embryo.

"During the first 10 days the iodin value of the yolk fat did not vary much; it decreased from 70 to 64. After this there was a marked decrease, the value fell from 64 to 43.7. The iodin value of the chicken fat was at first low, 59.4 to 61.1. This may be due to the presence of other substances in the fat obtained; in the early stages the amount of fat extracted was very small, and it contained a relatively large proportion of the brown substance which is very soluble in water and insoluble in water-free ether, but soluble in wet ether; this brown substance is probably glycerol and glycerophosphoric acid. As development proceeds the iodin value rose and after the fifteenth day was considerably higher than that of the fat from a fresh yolk. Just as in the case of the phosphorus compounds the most marked changes occur between the thirteenth and twentieth days, the maximum being reached just before the chick is hatched. The decrease in the iodin value in the yolk fat is suggestive of a primary absorption of the less saturated fats with a subsequent equal absorption of saturated and unsaturated fat. The increase in the iodin value of the chicken fat points to a desaturation of the absorbed fat."

The action of X-rays on the developing chick, J. F. Gaskell (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 564, pp. 305-310*).—When incubating eggs were exposed to the action of X-rays the mitotic activity of the growing tissue was lowered, an effect which was very evident in embryos exposed to long doses, as no mitotic figures could be found in an embryo of 3 days when exposed for 4 hours. Diminution was progressive even with small doses, but if not too great complete recovery occurred. The critical dose which prevents recovery varied with the stage of the development of the embryo, decreasing as the mitotic figures decreased. No other microscopic nor macroscopic changes were observed.

Data on the relative conspicuousness of barred and self-colored fowls, R. Pearl (*Amer. Nat., 45 (1911), No. 530, pp. 107-117, figs. 4*).—Statistics are presented which cover the hatching season of 1909 at the poultry plant of the Maine Station. These show that though barred birds were relatively much less conspicuous than birds of one color, the relative inconspicuousness of the barred color pattern did not afford its possessors any great protection against elimination by natural enemies.

The White Orpington color problem, G. D. Black (*Rel. Poultry Jour., 18 (1911), No. 2, pp. 232, 269*).—Some possible causes of brassiness (fading of the feathers) in white breeds are suggested. The author does not think that it is induced by the nature of the feeds, but on the other hand supposes it to be some physiological condition that may be bred out.

Forcing egg yield by use of artificial light, W. H. Reynolds (*Rel. Poultry Jour., 18 (1911), No. 2, pp. 240, 241, 262-264, figs. 4*).—A report of an experiment in lengthening the "working hours" of hens in the winter season by turning on an electric light an hour before daylight and after dark. The egg yield was increased and no ill effects noted. The yield dropped in 4 days after the light was discontinued.

Poultry raising and the increased price of meat, K. WAGNER (*Fricks Rundschau, 1910, Nov. 5; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 318*).—It is suggested that instead of offering money prizes at poultry shows the prizes should be distributed among poultry farmers undertaking to put a certain number of fowls and eggs on the market every year at fixed prices, and to those raising the best 4-month chickens and 8-month hens for breeding. Other measures recommended for encouraging the poultry industry are leasing of pasture lands, granting of subsidies to poultry societies, and offering more poultry courses in agricultural schools.

The white laced red Cornish fowl, W. H. CARD (*Rel. Poultry Jour., 18 (1911), No. 2, pp. 236, 265–267, figs. 2*).—An account of the origin and characteristics of a comparatively new breed that was not a chance creation but "a variety whose every characteristic was thought out and attained after persistent effort and intense study of the laws of nature regarding feather markings and undercolor that are in harmony with popular market requirements, also the laws of nature regarding egg production and flesh properties."

The Indian Runner duck book, C. S. VALENTINE (*Ridgewood, N. J., 1911, pp. 89, figs. 8*).—A practical work written to supply information on this variety of duck, which has recently become very popular.

Darwinism, biometry and some recent biology, I, K. PEARSON (*Biometrika, 7 (1910), No. 3, pp. 368–385*).—A discussion of the elimination of the unfit, the inheritance of the somatic characters on which fitness depends, and the absence of differential fertility.

Recent papers by Pearl (E. S. R., 21, p. 372), Jennings (E. S. R., 21, p. 469), Lloyd (E. S. R., 22, p. 672) and others are reviewed, and it is stated that there is no justification for the conclusion of these authors that selection has no effect within the pure line. It is also maintained that the only way in which it can be determined whether selection within the pure line is effective is to compare the correlation of the offspring with both parents and grandparents in a parthenogenetic species. In the only cases in which this has been done the parental correlation is greater than the grandparental, which would indicate a cumulative effect of selection.

The correlation between horn and hoof development, G. HEERWAGEN (*Deut. Landw. Tierzucht, 14 (1910), Nos. 17, p. 194; 42, pp. 497, 498*).—The author criticizes the findings of Laurer (E. S. R., 23 p. 174) on the ground that there was too wide a variation within the group, that the age of the animals was not considered, and that not enough animals were measured to warrant drawing definite conclusions.

[The correlation between horn and hoof development], G. LAURER (*Deut. Landw. Tierzucht, 14 (1910), No. 29, pp. 340–342; 15 (1911), No. 6, pp. 62–66*).—Replies to the criticism noted above.

The function of the corpus luteum (*Jour. Amer. Med. Assoc., 56 (1911), No. 8, pp. 595, 596*).—An editorial which summarizes recent work,[a] from which it is evident that secretions of the corpus luteum affect the sexual cycle. One important function seems to be the prolongation of the length of time between two successive ovulations. The secretion sensitizes the uterine mucosa so that it reacts to any sort of mechanical stimulus toward forming the maternal placenta. Up to the present time negative results only have been obtained in the attempt to produce the characterisic effect of the secretion under normal conditions by injecting extracts of the fresh corpus luteum.

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[a] For references to recent studies on the histology of the corpus luteum and the secretions of germinal glands of both sexes of different animals see *Zentbl. Gesam. Physiol. u. Path. Stoffwechsels*, n. ser., 6 (1911), No. 5, pp. 214–224.

On the differences in metabolism of rabbits' ova and their significance in the sex problem, A. Russo (*Biol. Centbl., 31 (1911), Nos. 2, pp. 51–58, figs. 5; 6, pp. 177–182, figs. 3*).—Further details are given concerning the two kinds of ova (E. S. R., 23, p. 472), as an answer to the author's critics.

The Mendelian ratio and blended inheritance, S. Hatai (*Amer. Nat., 45 (1911), No. 530, pp. 99–106*).—A mathematical presentation of blended inheritance as a limiting case of alternative inheritance when dominance is imperfect.

Creating new animals and plants, W. J. Spillman (*Sci. Amer., 104 (1911), No. 7, pp. 164, 165, 184, 185, figs. 11*).—Examples are given of the way in which Mendel's law may be used to improve domesticated animals and plants.

Transmission of white in horses, W. E. Castle (*Breeder's Gaz., 59 (1911), No. 15, p. 948*).—A note on a white stallion which is a heterozygous dominant. An estimate is given of the probable nature of his offspring.

[Canary breeding] (*Biometrika, 7 (1910), No. 3, pp. 398–408, figs. 3*).—A further discussion by C. B. Davenport, A. R. Galloway, and D. Heron on articles previously noted (E. S. R., 20, p. 1072; 22, p. 172).

On the influence of hybridizing on the form, color and markings of canary eggs, A. von Tschermak (*Biol. Centbl., 30 (1910), No. 19, pp. 641–646*).—Female canaries were crossed with the siskin, linnet, goldfinch, bullfinch, and other wild birds. In length, breadth, and form the eggs had the characteristics of the mother, whereas the color of the shell was frequently the color of the shell of the species to which the male belonged.

A partial index to animal husbandry literature, C. S. Plumb (*Columbus, Ohio, 1911, pp. 94*) —This bibliography of books, articles, and experiment station publications on animal husbandry was prepared with blank leaves so that other useful titles might be added. "It is limited in the number of titles, but many of the references are quite available, consequently the list should be serviceable. The titles of many of the books are given in considerable detail, thus indicating the nature of the contents. Occasional brief comments are made by the writer on the value and standing of certain books, bulletins or articles."

DAIRY FARMING—DAIRYING.

Studies of the protein requirements of dairy cows, F. W. Woll and G. C. Humphrey (*Wisconsin Sta. Research Bul. 13, pp. 175–216*).—This reports a study of the milk records and character of the rations fed to the university dairy herd for a perod of 9 years.

The method of management of the herd and records of the individual cows has been previously noted from time to time. Throughout the period there has been a general improvement of the herd, but there have been marked variations in each period when the system of feeding followed has been nearly uniform. After making due allowance for these disturbing factors, however, the results show that the production of the cows on high protein rations was in general lower than that on medium protein rations. The average for periods A and C, when the medium protein ration was fed, was 321.66 lbs. of butter fat per head per year, as against 307.9 lbs. for period B when a high protein ration was fed.

"The total value of the products per year per cow . . . was, for periods A and C $87.15, and for period B, $80.49, a difference of $6.66 in favor of the medium protein rations. The cost of the feed was for periods A and C $38, and for period B $38.72; the net profit per cow per year for the different periods was therefore as follows: Period A, $44.39, period C, $53.90; average of periods A and C, $49.15; period B, $41.77, a difference of $7.38 per cow annually, or 17.7 per cent in favor of the medium protein rations.

"In spite of the fact that the high protein rations cost somewhat more, on the average for the herd than those medium in protein, more milk and more butter fat were produced on the latter and about 18 per cent larger net profit per cow was obtained on the average for the respective periods of the investigation."

"While the general results of this investigation lead to the conclusion that the exact amount of protein required in the feeding of dairy cows is less important than was formerly believed to be the case, it is nevertheless certain that a liberal supply of protein is necessary for the production of large amounts of milk and butter fat; it can be readily shown, in fact, that there is a direct relation between the production of total solids or butter fat and the amounts of digestible protein fed or the nutritive ratios of the rations fed dairy cows. . . . The larger the production, the more feed the cows eat, and the narrower the nutritive ratio becomes."

"The teachings of the investigation described in this bulletin tend to emphasize the importance of farm-grown feeds for dairy cows."

Milk records, analyses, and cost of feeds, and an estimate of feed requirements for cows of different weights and productive capacity, are presented in tabular form.

The selection of feeds for dairy cows, F. W. WOLL and G. C. HUMPHREY (*Wisconsin Sta. Bul. 200, pp. 3–17*).—A brief and popular discussion of the feeding of dairying cows, based largely on data reported in the bulletin noted above.

The separate inheritance of quantity and quality in cows' milk, J. WILSON (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1910), No. 35, pp. 470–479, dgms. 6*).—Using the data of the Ayrshire Cattle Milk Records Committee (E. S. R., 23, p. 780), the author submits diagrams intended to show that there is no correlation between quality and quantity in milk.

Note on the separate inheritance of quantity and quality in cows' milk, K. PEARSON (*Biometrika, 7 (1910), No. 4, pp. 548–550*).—The article noted above is criticized because of the clubbing together of tail frequencies, and because the diagrams failed to show the independence of quality and quantity of milk. The mean percentages and the variation in fat of the 4 groups of Wilson were estimated by the author, with the following results:

Mean percentages and variations of fat in milk of Ayrshire cattle.

Quantity of milk.	Means.	Standard deviations.
	Per cent.	*Per cent.*
Under 500 gallons	3.710±0.010	0.372±0.007
From 500 to 600 gallons	3.673± .007	.319± .007
From 600 to 700 gallons	3.651± .008	.321± .005
Over 700 gallons	3.640± .008	.275± .006

"For the whole population of 2,866 cows the mean is 3.672 and the variability is measured by 0.323. It will accordingly be clear that there is (1) a slight but perfectly definite decrease in quality with increase of quantity, the low-yielding cows having a higher, the high-yielding cows a lesser fat percentage than the average Ayrshire, although the increase and decrease only amount to about 1 per cent of the average yield, and (2) the variation in quality is not the same for cows of each quantity category. Cows which give high quantity have far less variation in their yield of butter fat than cows of low yield. The number of cows is so large relatively that the probable errors are small and there is no doubt about the results being significant. Owing to the manner in which the tails of the above frequency have been clubbed together it is not possible to work out the proper correlation by the ordinary product moment method. The means, however, suggest that the correlation can not be very far from linear, and the correlation ration η may be fairly taken to measure r. This gives us $r=-0.075$ with a probable error of 0.013, a result, if small, yet indefinitely significant."

The dairy cow and her record, W. K. Brainerd (*Virginia Sta. Circ. 8, pp. 23, figs. 7*).—This contains information for the practical dairyman as to how the unprofitable cow can be weeded out by weighing the milk and testing for fat.

Abnormal milk secretion, Barnowsky (*Deut. Landw. Tierzucht, 15 (1911), No. 6, pp. 61, 62*).—A citation of cases where milk has been secreted in males and in females of different species of animals before conception.

On the accidental presence in milk of sulphocyanids and their origin, Stœcklin and Crochetelle (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 23, pp. 1530, 1531*).—Milk from cows fed linseed cakes showed the presence of sulphocyanids. Analysis of the cake showed that it contained oil of mustard, which apparently was converted into sulphocyanid in the organism and thence transferred to the milk. Evidently the cakes had been adulterated with products of cruciferous plants.

Production of hygienic milk, D. Morales (*Rev. Facult. Agron. y Vet. La Plata, 2. ser., 7 (1910), pp. 1–50*).—A discussion of the factors involved in the economic production of pure milk in Argentina. Suggestions are offered for the care of dairy cattle, management of milk, inspection of market milk, and cooperation in its distribution.

The action of the medical officer of health in dealing with milk supplies affected by outbreaks of sickness among cows, H. Stott (*Jour. Roy. Sanit. Inst., 32 (1911), No. 1, pp. 20–26*).—A brief discussion of the different diseases which are liable to be spread by contaminated milk. The duties of health officers in the event of a milk-borne epidemic are pointed out.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment, 787, 788, p. 1 each*).—These relate to the adulteration of milk.

The bacterial content of separator cream and separator milk, P. G. Heinemann and E. Class (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 3, pp. 209, 210, pl. 1*).—A continuation of earlier work (E. S. R., 22, p. 478). The object of these experiments was to determine whether the amount of fat and cream bore any relation to the bacterial counts, and also whether a definite relation could be established with the bacterial content of the separator milk.

"Separator cream contains smaller numbers of bacteria than the milk from which it is obtained. The number of bacteria in separator cream decreases proportionately as the fat content increases. The number of bacteria in separator milk is larger than the number in the milk from which it is obtained if the cream contains up to about 35 per cent fat. Above this percentage the number is smaller. The number of bacteria in separator milk decreases proportionately with the increase of fat in the separator cream."

On the Bulgarian ferment, J. Effront (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 8, pp. 463–465*).—A note on a species of bacteria obtained from milk soured with the Bulgarian ferment, which behaves quite differently from the species usually found in medicinal preparations of milk ferment in that it acts feebly upon casein and is strongly acidifying, though the percentage of volatile acids is relatively small.

The bacteriology of "tätté melk," P. S. HEINEMANN (*Science, n. ser., 33 (1911), No. 851, p. 630*).—This favorite food in Scandinavia is made by inoculating sweet cow's milk with the leaves of butterwort (*Pinguicula vulgaris*), which causes the milk to become thick and slightly stringy and with a slight cheesy taste and odor.

A microscopical examination of the samples showed streptococci in large numbers, mostly in diplococcus form. Two species of yeast were abundant, one being oval and the other a large organism with square ends, often forming long filaments. There were also some bacilli resembling *Bacillus coli* in shape and size, which proved to be gram-negative. There were a few large bacilli, resembling that group commonly found in milk and which forms larger amounts of acid than ordinary lactic-acid bacteria.

A study of plate cultures was made, and the different organisms isolated. "The streptococcus could not be distinguished microscopically from *Streptococcus lacticus*, but its action on sterile milk differed, in that it coagulated but slowly; after coagulation the coagulum was stringy, similar to the coagulum formed by *B. bulgaricus*, but in a smaller degree. The oval yeast gave the microscopic picture of *Saccharomyces cerevisiæ*. It ferments lactose and saccharose with violent gas production, levulose slowly, and maltose not at all. Cultures of this yeast in liquid beerwort impart a somewhat stringy consistency to the medium. The other yeast proved to be *Oïdium lactis*, which is always present in milk and in this milk is probably responsible for a slight cheesy taste and odor."

The salting and ripening of Roman "pecorino," G. FASCETTI (*Indus. Latt. e Zootec., 8 (1910), No. 22, pp. 416, 417; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant-Diseases, 1910, No. 2, pp. 316, 317*).—The method described is that in use by the associations of the Roman Campagna.

The fresh cheeses are carried to the dairies, where they are pricked with a needle and rubbed with salt to prevent a rapid fermentation. They are then placed on shelves and covered with a layer of salt, which is occasionally renewed, for 3 or 4 months or until no more salt is absorbed. The forms are then covered with a paste made of olive oil, suet, and kaolin to prevent drying. The process requires at least 2 curing houses, one underground where the temperature is about 12° C. at the first period of the salting and for the last period of the ripening process, and another at a temperature between 15 and 18° for the second salting period and the drying of the cheese by the elimination of the whey.

Géromé cheese, A. ROLET (*Lait. et Indus. Ferme [Paris], 21 (1911), No. 3, pp. 17–19*).—A description of the method of making Géromé cheese, also called Gérardmer (and sometimes, although incorrectly, Munster), which is extensively made in the department of Vosges.

A method for preserving butter (*Indus. Beurre, 1910, p. 511; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant-Diseases, 1910, No. 2, p. 315*).—The method of preserving butter which is described consists in applying a coat of powdered white sugar after dissolving it in hot water.

The water supply and the removal of the waste water of creameries, F. GUTH (*Gsndhts. Ingen., 34 (1911), No. 9, pp. 163–165*).—A lecture before the International Congress of Agricultural Associations at Brussels, September, 1910. The chemical and biological properties of the water supply of creameries and the disposition of wastes are discussed.

Creamery bookkeeping, M. MORTENSEN (*Iowa Sta. Bul. 121, pp. 306–322*).—A complete system of bookkeeping is outlined, the object being to present a system which can be carried out by small creameries with a small amount of labor. Sample forms given include those for the driver's report, the daily receiving record, the route checking record, patron's statement, purchase and sales records, orders for goods, sale slip for shipment, daily cost record, and monthly inventory.

VETERINARY MEDICINE.

Upon the real immune state and the question of immunity in infectious diseases, E. METCHNIKOFF (In *Les Prix Nobel. Stockholm, 1908, pp. 1-24*).—This is the author's address before the Nobel Prize Committee at Stockholm in 1908.

In regard to the partial functions of the cell, P. EHRLICH (In *Les Prix Nobel. Stockholm, 1908, pp. 1-19*).—This is the author's address before the Nobel Prize Committee at Stockholm in 1908, and deals particularly with his newer work in chemotherapy.

Hematological technique, H. SCHRIDDE and O. NAEGELI (*Hämatologische technik. Jena, 1910, pp. VI+135, pl. 1, figs. 20*).—The first part of this work, on the technique of histological methods of studying the blood and blood-forming organs, is by H. Schridde; the second part, on the technique in clinico-morphological studies of the blood, is by O. Naegeli.

Contribution to the study of the physiology of Spirillum gallinarum.—I, Assimilation of glucose, A. PONSELLE (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 30, pp. 307-309; abs. in Chem. Abs., 5 (1911), No. 3, pp. 519, 520*).—It was found in experiments with this organism in vitro that the agglutination and loss of motility process makes use of the glucose in the blood of the host for glucolysis. The blood, according to the author, contains a catalytic agent which aids in the assimilation of the glucose, the glucose not being assimilated directly by the organism.

The supposed catalytic agent is resistant to a heat at 110° C., this only for a few minutes. Oxygen was found to be necessary for the reaction, which progresses slowly at 15° and rapidly at 37°. It was found that the liver also contains the catalytic substance, and could be substituted for the red blood corpuscles. The spirillum dies in a few minutes at 37°, unless calcium carbonate is present to neutralize the acids in formation.

Cultivation in vitro of the thyroid gland, A. CARREL and M. T. BURROWS (*Jour. Expt. Med., 13 (1911), No. 4, pp. 416-421, pls. 3*).—The authors find that "the thyroid gland in mammals can be cultivated outside the body. The proliferated elements consist of connective tissue and epithelial cells, the former predominating. The cells survive in cultures for 2 weeks or longer, which period can be increased by secondary and sometimes by tertiary cultivations."

Contribution to the study of bacterial filtrates and extracts, T. KIKUTSI (*Beiträge zum Studium der Bakterienfiltrate und der Bakterienextrakte. Diss. Osawa, 1910; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 11, p. 984*).—Bouillon filtrates and aqueous extracts from agar cultures of various pathogenic and saprophytic bacteria did not yield any soluble, thermostable, bactericidal substances, with the exception of *Bacillus pyocyaneus*. Some of the bactericidal substances of *B. pyocyaneus* were found in the filtrates, while others were only present in the watery extracts. The thermostable substance which was extracted with alcohol is, according to the author, a lipoid-protein combination, and is only broken up when the bacterial substance is treated with alcohol, and then only is its bactericidal action manifest. Normal bovine and sheep sera and human ascitic fluid produced precipitates with bacterial extracts or filtrates. This precipitation does not occur when the serum or ascitic fluid is heated to 60° C.

The relation between the protein of woman's milk to that of the serum protein in mother and child, A. BAUEREISEN (*Arch. Gynäkol., 90 (1910), No. 2, pp. 349–394; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 4–5, pp. 159, 160*).—The author studied this problem from 3 view points: (1) The relation of the proteins among themselves and to the serum protein of the mother; (2) the relation of the milk proteins to the protein of the blood serum of the newborn; and (3) the relation of the colostrum proteins to the serum of the newborn, as determined with the aid of biological and biochemical methods.

The analysis of the antigens showed that the protein content of the mother serum was 8.15 per cent; of the colostrum 8.41 per cent; that obtained from the serum of the umbilical cord of the new-born contained 5.5 per cent, while the whey protein had only 0.42 per cent. The biological results with the precipitin reaction showed that the constitutional specificity is very definite with casein, but that a close relation is also seen between the colostrum protein, the whey protein from the milk which follows, and the serum protein of the mother. It was further found that the blood serum of the new-born which has not suckled contains the same antigens as that of the mother but in a lesser quantity, since the mother's serum contains more true protein.

The author finally presents the hypothesis that the more living protein the individual has the greater is his resistance. On the basis of his findings as to colostrum proteins, the author points out the enormous importance of colostrum in the nutrition of the young, and gives biological, chemical, historical, and evolutionary data to demonstrate this.

The value of the mouse-feeding test for meat inspection, KEMPA (*Berlin. Tierarztl. Wchnschr., 26 (1910), No. 40, pp. 785–787*).—The results point to the fact that the mouse-feeding test can easily be eliminated in judging meat for human consumption. Total reliance can be placed on the bacteriological method (E. S. R., 22, p. 183; 23, p. 183).

The xiphoid lymph-gland, STROH (*Ztschr. Fleisch u. Milchhyg., 20 (1910), No. 8, pp. 249–252, figs. 2; abs. in Vet. Rec., 23 (1911), No. 1174, pp. 423, 424*).—The author describes a lymph-gland which he has discovered in the angle formed by the cartilage of prolongation of the last sternal rib and the sternum which is of importance in meat inspection work.

The xiphoid lymph-gland of Stroh, P. GODBILLE (*Hyg. Viande et Lait, 4 (1910), No. 12, pp. 633–638, figs. 4; abs. in Vet. Rec., 23 (1911), No. 1174, pp. 423, 424*).—The author gives an account of the anatomical relations of the xiphoid lymph-gland mentioned in the account noted above and gives directions for exposing it. The gland, which varies from the size of a pea to that of a haricot, is not constant, being found upon an average in 6 out of 10 subjects.

Meat inspection at Karlsruhe, Manheim, and Ludwigshafen, P. BRANDT (*Volksw. Abhandl. Bad. Hochsch., 9 [1908], No. 6, pp. 141*).—Slaughtering, inspection of meat, and similar matters are discussed with special reference to the localities under consideration.

Live stock sanitary laws of the State of Arkansas, W. LENTON (*Arkansas Sta. Bul. 106, pp. 351–366*).—This bulletin includes the text of the state live stock sanitary laws, the regulations of the board of control of the station, the governors' proclamations in regard to county quarantines, and federal quarantine regulations applicable to Arkansas, together with notes on these laws and regulations.

Report of the bacteriologist, C. E. MARSHALL (*Michigan Sta. Rpt. 1910, pp. 150–152, 160–179*).—In order to test the danger of tuberculosis from apparently healthy animals that reacted to tuberculin, several pigs of about 50 lbs. weight were kept in contact with 2 cows for periods of from 66 to 82 days. The pigs failed to develop the disease, and this was also the case with guinea pigs, injected with bouillon suspension of feces, and with a calf that sucked one of the cows. Upon slaughtering the cows only a few slight calcified and encapsulated lesions of the bronchial lymph glands and lungs were found in one; while in the other the right bronchial glands were greatly enlarged, the tubercular mass showed calcareous degeneration, and the right cephalic lobe of the lungs contained a large tubercular mass undergoing liquefaction.

A tabular report is given of herds treated with hog-cholera serum during the years 1908 to 1910. Studies made by Giltner of the cellular elements of the blood of hyperimmune hogs show that "the successive weekly bleedings lessen the number of erythrocytes in proportion as the number of bleedings increases. In most cases the number of leucocytes is decreased. The decrease in number of leucocytes is due to a constant decrease in large mononuclears, and a nearly constant decrease in lymphocytes and eosinophiles while this disease is only partially offset by a nearly constant increase in polynuclears and mast cells. There may be a slight temporary increase in the number of erythrocytes per cubic centimeter immediately after bleeding. There is a tendency for both the actual numbers and the percentages of lymphocytes to decrease and of polynuclears to increase immediately after bleeding. Changes in the staining properties of the erythrocytes may result from repeated bleedings of serum hogs. The changes noted in this connection are in harmony with what has been observed by others in studying the effects of hemorrhage on the cellular elements of the blood."

Tests made with lactic-acid cultures for irrigation in contagious abortion and other diseases in an attempt to find a substitute for the ordinary coal tar and chemical antiseptics are briefly described. Investigations made of an outbreak of disease among sheep in Kent County resulted in the discovery of the stomach worm (*Hæmonchus contortus*) to be the cause. Small numbers of the whipworm (*Trichocephalus affinis*) were found in the cecum and small nodules due to *Œsophagostoma columbianum* in the intestinal walls. In 1 lamb examined many of the bronchioles in the dorsal portion of both principal lobes of the lungs were filled with lungworms (*Strongylus filaria*). Notes are given on a disease of cattle near Kinde, Huron County, which was not considered to be of an infectious or parasitic nature, several cases of hemoglobinuria in horses near Laingsburg, and a wasting disease of horses at Imlay City.

Eighth annual report of the state board of live stock commissioners of Ohio, 1908–9, P. FISCHER ET AL. (*Ann. Rpt. Ohio Bd. Agr., 64 (1909), pp. 659–698, figs. 19*).—The occurrence during the year of stock diseases is briefly reported upon.

Annual report of the Bengal Veterinary College and of the Civil Veterinary Department, Bengal, for the year 1909–10 (*Ann. Rpt. Bengal Vet. Col. and Civ. Vet. Dept., 1909–10, pp. 1–7+1–12+VIII+2*).—The annual report of the Bengal Veterinary College, by F. Raymond (pp. 1–7) includes accounts of the occurrence of epizootic diseases in Calcutta and vicinity, and of the work of the research laboratory. The report of the Civil Veterinary Department is by D. Quinlan (pp. 1–12).

In the reports on contagious disease it is stated that the total mortality among equines and bovines was 386 and 17,645 respectively, against 301 and 16,456 the previous year. Glanders was responsible for the death of 160 equines. Tabulated data show rinderpest to have killed 8,869, foot-and-mouth disease 2,374, hemorrhagic septicemia 3,130, black quarter 737, and anthrax 812, bovines. The report includes an account of preventive inoculations against rinderpest, only 93 of 12,549 animals having died after inoculation.

Investigations in regard to putrefaction products which are bactericidal to the anthrax bacillus, K. STEIN (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910),* *No. 6, pp. 634–651*).—It appears from this work that bacterial-free filtrates from putrefying animal cadavers contain a heat-stabile bacteriolytic enzym (for the anthrax bacillus) which has its optimum at 37° C. The enzym content of the putrefying material was found to vary with the degree of putrefaction—the further the putrefying process proceeds, the lower the enzym content will be. The enzym can be precipitated with Nessler's reagent and hydrochloric acid, but not with tannic acid.

A lethal infection with putrefying anthrax material for experimental animals was not possible, because the virulence had already been disturbed before inoculation. The enzym was also not capable of checking an already existing anthrax bacteremia in mice. As the putrefying anthrax-bactericidal material was in itself toxic, it was not possible to protect against a subsequent infection with anthrax bacteria.

[Anthrax outbreak on university farm], H. L. RUSSELL (*Wisconsin Sta. Bul. 203, pp. 7–9*).—This is a brief description of an outbreak of anthrax in the university herd and the manner in which it was handled. The general opinion that hogs do not acquire anthrax unless fed on anthrax-infected carcasses was found to be erroneous, as it is concluded that the death of several hogs in the herd must have come from soil infection.

The specific cure of yaws with dioxydiamidoarsenobenzol, R. P. STRONG (*Philippine Jour. Sci., B. Med. Sci., 5 (1910), No. 4, pp. 433–451, pls. 14*).—Reports are presented of 25 cases of yaws or frambesia treated with salvarsan. This drug appears to be an ideal specific for the disease. "Three or 4 days after the injection of the drug, the granulomatous lesions begin to disappear and in the course of from 10 to 20 days they usually have disappeared entirely leaving a perfectly smooth, pigmented skin where the lesions previously existed."

The treatment of yaws (frambesia) with arsenobenzol (salvarsan), R. P. STRONG (*Jour. Expt. Med., 13 (1911), No. 4, pp. 412–415, pls. 2*).—A preliminary account of the investigations reported in the article noted above.

The curative effect of salvarsan ("606") in cases of frambesia, H. ALSTON (*Brit. Med. Jour., 1911, No. 2616, pp. 360, 361*).—The author finds that the serum of patients treated with salvarsan is capable of producing an improvement in other cases of yaws not less marked than that produced by the drug itself, also that the serum of the patients thus treated with serum possesses the same property. Control experiments show that it is essential that the serum be derived from a patient suffering from yaws and that the serum be taken when the patient is under the influence of salvarsan.

The curative effect of salvarsan in frambesia, H. ALSTON (*Brit. Med. Jour., 1911, No. 2620, p. 618*).—"The experiments in Trinidad have contributed to knowledge in 4 directions: (1) The serum of cases recovering under salvarsan has been shown to have a curative effect; (2) nostril yaws tubercles are not affected by salvarsan nor by serum; (3) the milk of a goat injected with salvarsan has a curative effect; and (4) soamin and orsudan are the only organic compounds—excluding salvarsan, of course—that cause some benefit in yaws."

The complement fixation reaction of rabies, N. A. DOBROWOLSKAJA (*Centbl. Bakt. [etc.], 1. Abt., Orig., 56 (1910), No. 2, pp. 177–183*).—As a result of immunizing dogs against rabies, bodies are produced in the blood which give a definite complement binding or fixation reaction with specific antigens. The reaction, according to the author, for the present has no practical significance, because at times it can be produced with nonspecific antigens. An effort to determine specific substances (with brain substance from rabid animals) in the blood with the reaction resulted in showing that a positive test could also be obtained with the blood from normal dogs at the height of digestion.

An investigation into scabies in laboratory animals, R. C. Low (*Jour. Path. and Bact., 15 (1911), No. 3, pp. 333–348, pls. 9*).—The author here presents a short description of the appearances, methods of diagnosis, the course usually run, and measures to be taken to prevent the spread of scabies among laboratory animals.

Tetanus, P. F. Bahnsen (*Amer. Vet. Rev., 38 (1911), No. 4, pp. 502–510*).—This article deals particularly with the treatment of tetanus in animals.

An attempt to cure toxicosis of pregnancy with the serum from pregnant subjects, A. Mayer and Linser (*München. Med. Wchnschr., 57 (1910), No. 52, pp. 2757–2759, figs. 2; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 11, p. 985*).—A general review of the theories of toxicosis of pregnancy is given, after which the authors present a hypothesis that the condition is due to the presence of foreign proteins in the mother's blood, and an absence of the corresponding antibodies. The presence of an increased antitryptic index, an activated cobralysin, and peptolytic enzyms favors this hypothesis.

The authors describe a case of herpes gestationis in a woman, who was treated with 30 cc. of a serum obtained from another pregnant subject. A rapid resolution of the disease took place.

About some contested points in the biology of the tubercle bacillus, G. Deycke and H. Much (*Berlin. Klin. Wchnschr., 47 (1910), No. 42, pp. 1933–1935*).—A reply to Aronson[a] in regard to the acid-fast bodies, including fats, fatty acids, etc., in the tubercle bacillus and the solution of the bacilli by neurin.

The detection of tubercle bacilli in the circulating blood, S. Acs-Nagy (*Gyógyászat, 28 (1910), July, pp. 494–496; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 12, p. 629*).—The author found tubercle bacilli in the blood stream of 24 human tuberculous subjects. The work shows that tubercle bacilli can also occur in the blood stream when the process is a localized one.

About the intravenous inoculation of mice with human and bovine tubercle bacilli, R. Trommsdorff (*Arb. K. Gsndhtsamt., 32 (1909), No. 2, pp. 568–573*).—According to the author, no work is at hand in regard to the intravenous inoculation of mice with tubercle bacilli. In this investigation he utilized the tail vein, and in the article gives the technique in detail.

The results show that with the human type of tubercle bacillus not a single mouse died, nor did the animal on autopsy show any indication of the disease. On the other hand, where the bovine type of tubercle bacillus was inoculated the animals became tuberculous. The author points out the possibility of utilizing the mouse for differential diagnosis.

On the results of investigations of bovine tuberculosis during recent years, B. Bang (*Tidsskr. Landökonomi, 1910, No. 2, pp. 100–136*).—A review of recent investigations of bovine tuberculosis and its relation to human tuberculosis, with remarks on the combating of tuberculosis.

Enzootic of avian tuberculosis, which was possibly of human origin, Darmagnac (*Rec. Méd. Vét., 86 (1909), No. 15, pp. 504–506*).—The author describes cases of avian tuberculosis in chickens and a turkey, some of which were killed for human food. He discusses the possibility of its having its origin from man.

The Ninth International Tuberculosis Conference, Regener (*Ztschr. Tuberkulose, 16 (1910), No. 6, pp. 600–605*).—The ninth conference was held at Brussels, October 5 to 8, 1910. It was organized in 4 sections, which discussed respectively the following topics: (1) Clinical and experimental studies (discussed by Messrs. Landouzy of Paris, Williams of London, Aufrecht of Magdeburg, and Raw of Liverpool); (2) protection of children against tuberculosis (discussed by Messrs. Bielefeldt of Lubeck, Bruck of Berlin, Rördam of Copenhagen, Pynappel of Zwolle, and Hamel and Nietner of Berlin); (3) tuberculosis and the school (discussed by Messrs. Altschul of Prague, Fronz of Vienna, Gumprecht of Weimar, Jacob of Berlin, and Patrikios of Athens); and (4) combating tuberculosis by women (discussed by Dr. Lefèvre of Gembloux, Mrs. Altschul of Prague, Mrs. Girard-Mangin of Paris, Mrs. Pannwitz of Charlottenburg, Mrs. Pischinger of Lohr, and Mrs. Pynappel of Zwolle, and the Misses Possaschnaia of St. Petersburg, Sommer of Bern, and Chaptal of Paris).

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[a] Berlin. Klin. Wchnschr., 47 (1910), No. 35, p. 1617.

Malignant diseases in bovines, A. M. TROTTER (*Jour. Compar. Path. and Ther., 24 (1911), No. 1, pp. 1–20*).—The results are reported of an inquiry undertaken to ascertain the age, sex, and organ incidence of disease in bovines affected with malignant neoplasms.

The cultivation of the organism of chronic bovine enteritis, ALBIEN (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 41, pp. 793, 794*).—A polemical article in which the author (E. S. R., 20, p. 581) replies to Miessner,[a] and in which he gives the formula of the glycerin-agar media [nutrient, Heyden from 5 to 10 gm., agar from 10 to 20 gm., glycerin from 20 to 30 gm., sodium chlorid 5 gm., a normal solution of sodium carbonate crystals (28:100) 5 gm., and distilled water 1,000 gm.] on which the above organisms will grow. See also a previous note (E. S. R., 22, p. 287).

A minute on the cattle disease, R. WILLMOT (*Agr. and Stock Dept. Tasmania, Bul. 19, 1910, pp. 15, pls. 8*).—This is a preliminary account of chorea paralytica bovis, commonly known in Tasmania as "the cattle disease."

Observations and researches on enzootic hematuria of bovines, KORSCHANN (*Österr. Monatsschr. Tierheilk., 1910, Nov.; abs. in Rev. Gén. Méd. Vét., 17 (1911), No. 197, p. 287*).—Piroplasmosis due to *Piroplasma bigeminum*, transmitted by *Ixodes ricinus*, occurs in Hungary along the Carpathian range. Acute and prolonged cases occur from time to time but usually the disease does not last longer than a week. The mortality is said to be low, not rising above 10 per cent.

Acute contagious mastitis in cows due to the Bacillus lactis aërogenes, J. A. GILRUTH and N. MACDONALD (*Vet. Jour., 67 (1911), No. 430, pp. 217–223*).—"*B. lactis aerogenes*, while not pathogenic by inoculation into the tissues of cattle, may yet cause acute inflammation if introduced into the lactating udder of cows. Such an infection may be readily spread by milking machines. The bacilli after the first few days of infection may be so few as to be overlooked. The secretion, although originally favorable to the growth of bacteria, rapidly assumes an inhibitory power. There is evidence that the blood serum itself rapidly becomes antitoxic."

The preparation of antirinderpest serum by means other than the injection of virulent blood, F. S. H. BALDREY (*Jour. Trop. Vet. Sci., 6 (1911), No. 1, pp. 1–20, pl. 1, charts 21*).—The author concludes "that the method of employing peritoneal washings to augment the amount of inoculable virulent material is a good one. It produces an antirinderpest serum of a high value, but less potent than that produced by blood inoculation. In comparison with serum from blood inoculations it is of great value in the less susceptible plains animals than in the highly susceptible hill cattle. Its reaction is produced principally by a toxin which is rapidly formed under the vital influence of the peritoneal cavity."

Stiff-sickness or stijfziekte in cattle, A. THEILER (*Agr. Jour. Union So. Africa, 1 (1911), No. 1, pp. 10–21, pls. 4*).—"The disease 'stiff-sickness' in cattle resembles in all respects laminitis in horses, in fact it may be called 'laminitis in cattle.' Experiments undertaken at 2 different places, Barberton and Zeerust, 1 in the eastern and 1 in the western part of the Transvaal under opposite climatical and tellurical conditions, show that *Crotalaria burkeana* is the cause of stiff-sickness."

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[a] Berlin. Tierärztl. Wchnschr., 26 (1910), No. 30, p. 593.

Veterinary notes (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 363–387*).—Notes are presented on "struck" sheep experiments, 1902–1909, and the prevention of parasitic diseases of sheep, by T. W. Cave, and a system of cropping for providing green food for lambs for the prevention of lamb diseases, by B. N. Wale.

Some neglected sheep diseases of New South Wales, M. HENRY and A. E. MASSY (*Agr. Gaz. N. S. Wales, 22 (1911), No. 2, pp. 109–117, map 1*).—The authors here record what is known of so-called black disease, louping ill, and staggers, in order to demonstrate the need of further investigations and to serve as a basis for such.

A minute on sheep diseases, R. WILLMOT (*Agr. and Stock Dept., Tasmania, Bul. 16, 1910, pp. 16*).—The author here considers braxy and louping ill.

Johne's disease in sheep, S. STOCKMAN (*Jour. Compar. Path. and Ther., 24 (1911), No. 1, pp. 66–69, fig. 1*).—The author considers the observations here reported to justify the statement "that sheep may under natural conditions become infected with Johne's disease and that this animal must now be considered a factor in the epizootiology of this affection. They do not, however, warrant the conclusion that the disease known as 'scrapie' is a form of Johne's disease, as it is possible, of course, that 2 different diseases may sometimes affect the same animals."

Serovaccination against hog erysipelas, SCHOLL (*Rev. Gén. Méd. Vét., 16 (1910), No. 182, pp. 65–69*).—This is a report of serovaccination work against hog erysipelas in Belgium. In 1903 there were 4,870 vaccinations and in 1909, 84,866. The results obtained were excellent.

Hog cholera, L. VAN ES (*Amer. Vet. Rev., 38 (1911), No. 4, pp. 489–501*).—A discussion of the etiology, symptoms, pathology, and serum treatment of this disease.

The swamp fever of horses, J. L. TODD and S. B. WOLBACH (*Jour. Med. Research, 24 (1911), No. 1, pp. 213–242, dgm. 1*).—The results are given of observations on 7 cases of swamp fever, 5 cases of which were artificially produced by direct inoculation. In this work the symptoms and the gross pathological and histo-pathological findings of the organs are reported. All the subjects with one exception came to autopsy.

The ring bodies of Ballah were noted in all the horses, but similar bodies could be seen by the authors in the liver of a normal dog. Sarcosporidia and *Sclerostomum equinum* or *S. tetracanthum* were almost always present.

According to the authors, the cases were too few in number to make it possible to draw definite conclusions from them. The results do not differ from those obtained by previous observers; consequently, the observations will merely serve to confirm those of others who have preceded them in studying the disease. A bibliography is appended.

The chemotherapeutic treatment of equine influenza, RIPS (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 7, p. 113*).—When a single injection of a full dose (0.01 gm. per kilogram of body weight) of a warm to blood-warm, dilute alkaline solution of salvarsan (Ehrlich-Hata 606) was given to a horse in the first stages of influenza, it was noted that this remedy could easily cope with the progress of the disease. Three gm. of salvarsan in 1,500 gm. of solution was generally found sufficient for a horse of medium weight. The later stages of the disease are also favorably influenced by this remedy.

Periosteotomy in spavin, J. J. WESTER (*Tijdschr. Veeartsenijk.*, *36* (*1909*), *No. 15*, *pp. 913–926; abs. in Vet. Rec.*, *23* (*1910*), *No. 1152*, *pp. 84*, *85*).—After having employed a majority of the usual methods of treating spavin the author has finally given preference to periosteotomy. His method of operation, which is a modification of that of Peters, is described in detail.

Symbiotic otacariasis of the cat, J. W. KALKUS (*Amer. Vet. Rev.*, *39* (*1911*), *No. 1*, *pp. 53–56*, *fig. 1*).—The occurrence in the State of Washington of several cases of auricular acariasis is reported. The first cases are said to have appeared in cats brought to this country in 1908 from the Isle of Man.

A sarcoma of the fowl transmissible by an agent separable from the tumor cells, P. ROUS (*Jour. Expt. Med.*, *13* (*1911*), *No. 4*, *pp. 397–411*, *pls. 6*, *figs. 2*).—In the experiments reported small quantities of the cell-free filtrate were sufficient to transmit the growth to susceptible fowls.

RURAL ECONOMICS.

The cost of living, H. P. FAIRCHILD (*Pop. Sci. Mo.*, *78* (*1911*), *No. 4*, *pp. 377–380*).—Maintaining that the price of foodstuffs is determined by the law of supply and demand and the proportion between those who produce and those who consume, the author attributes the cause of increased price of food commodities in the United States to the preponderance of the urban population. He asserts that the greatest total wealth of society can be produced only when the efforts of the agricultural classes are supplemented by those engaged in certain vocations of the city, and points out that there is a point in the economic development of a country when the number of those engaged in the city becomes excessive.

He questions whether that point has been reached in the United States. He shows that for every inhabitant in 1790 in cities of more than 8,000 population there were 28 persons living in the smaller towns and country districts; 50 years later there was one city dweller to 11 country dwellers; in 1880 the proportion had reached 1 to 3.4; and in 1900 1.2.

With this condition of affairs it would be supposed that owing to the high price of farm products there would be large profits to the farmer, country life would be more attractive, and the rush to the city checked. However, it is observed that the large excess over the actual cost of production does not find its way back to the pockets of the producers but is absorbed by transportation companies, commission merchants, packers, and retail dealers.

Prices of farm products to producer and consumer, JAMES WILSON (*U. S. Dept. Agr. Rpts. 1910*, *pp. 19–26*).—This report shows that the price received by the farmer for agricultural products is not exorbitant, and is much below that paid by the consumer. The wide difference in prices is attributed to the existing system of marketing farm produce, and it is shown that of every dollar the consumer pays for poultry, potatoes, fruit, dairy products, and some other necessaries, the producer receives on an average about 53 cts., the railroad company about 7 cts., and the middlemen about 40 cts. Other illustrations are given showing the costliness of the system under which farm products are transferred from farmer to consumer, and it is pointed out that part of the cost could be eliminated by substituting cooperative selling associations on the part of the farmers, and direct buying or cooperative buying by the consumer from these cooperative selling associations.

Current agricultural wages (*Amer. Agr.*, *87* (*1911*), *No. 13*, *p. 526*).—In addition to other statistics relative to farm labor the article gives a table recently compiled by the tariff board showing the average amount of wages paid by the day or month to farm laborers in the United States and Canada in 1909. It is shown that the average monthly rate of wages to farm hands without board in the United States in 1910 was $27.50 as compared with $18.33 in 1890.

Mathematical distribution of wages, O. Ballauff (*Illus. Landw. Ztg., 31 (1911), No. 11, pp. 85, 86*).—The author, after discussing the economic significance of the division of labor, deals more specifically with the subject of computation and mathematical distribution of wages as related to the various divisions of the operation of agricultural products, and determining the limit and application of wages as to the various operations of production. He goes into the subject of farm accounting, shows the possibility of having a careful and exact method of reckoning wages, and discusses the merits and defects of the different systems upon which wages are paid. The piecework system is considered the simplest and most practical and has the advantage of inducing the laborer to greater performance.

Report of the select committee on agricultural cooperation (*Rpt. Select Com. Agr. Coop. [Cape Good Hope], 1907, pp. XXXII+522*).—In addition to the testimony and other evidence collected by a special committee appointed to investigate the workings of agricultural cooperation and the advances made by the government for that purpose, the report states the findings and recommendations of the committee. Out of £85,491 11s. 8d. advanced during the period under review to various organizations and groups of individuals £41,652 15s. 2d. was advanced to wineries; £32,125 17s. 8d. to creameries; £7,275 to fencing syndicates; £1,959 to preserving companies; £595 18s. 2d. to boring syndicates; £375 to thrashing syndicates; and £130 11s. 2d. to live stock improvement syndicates.

The report shows that there is a lack of cooperation on the part of applicants for loans and that the government has made advances out of all proportion to the pecuniary interest of the members of the associations. In an illustration cited the government advanced £11,000, and the actual cash payments by shareholders of the cooperative society amounted to only £101, or less than 1 per cent of the sum advanced by the government.

The committee recommends that the government should not encourage or assist any society unless it is satisfied with the proposed management; that the loans should not exceed the face value of the issued capital, at least 25 per cent of which should be paid up before any loan is advanced; and that moneys loaned should be used in connection with operating expenses and not in payment of outstanding debts.

While the committee finds that misfortunes have befallen some of the efforts in cooperation it is of the opinion that the utility of the movement has been established and that farmers in their own interest will have to continue to develop it.

A traveling bank for farmers, D. G. Ricard (*Agr. Econ., 44 (1911), No. 496, p. 91*).—The article states that in order to induce the farmers in the up-country districts of the Cape and Transvaal and Orange River Colony to appreciate the advantage and safety of depositing their money in the care of a bank, a system of banking by motor car is in full operation. "The cars are fitted with a safe and desk, and the clerk in charge of the car receives deposits and pays out in checks. A regular route is arranged so that the people know when to expect the car. The cars call at the doors of the farmhouses 'for orders.'" The farmers at first manifested a great deal of distrust, but it is noted that this is gradually giving way.

The Jewish Agricultural and Industrial Aid Society (*Jewish Agr. and Indus. Aid Soc. Ann. Rpt. 1909, pp. 65*).—The report gives a history and summary of the work done by the Jewish Agricultural and Industrial Society since its organization. In a review of the work of the society for the last 10 years it is shown that during 1900 39 loans were made aggregating $14,425, and in 1909 there were 256 loans aggregating $141,494.48. The total amount of loans made during the 10 years aggregates nearly $800,000, and is distributed in Canada and 24 States of the United States.

Farm bookkeeping, W. J. SPILLMAN (*Nat. Stockman and Farmer, 34 (1910), Nos. 37, pp. 960, 961; 38, p. 991*).—The article outlines the principles in farm bookkeeping and illustrates a system of double-entry bookkeeping that can be kept by any farmer.

Farm bookkeeping (*Bd. Agr. and Fisheries [London], Leaflet 240, pp. 8*).—A simple system of farm bookkeeping requiring few books or different places of entry is discussed.

The agricultural valuer's assistant, T. BRIGHT (*London, 1910, 5. ed., pp. XII+308*).—This publication is intended to assist the agricultural tenant-right valuer to better prepare himself for discharging the various duties of his profession.

The tables are compiled and arranged in such a way as to show at a glance various calculations relating to agricultural products and labor. The author discusses and explains the various items to be considered and the methods used in determining the valuation of landed estates; gives tables showing the method of calculating the value of manures and feed stuffs from analyses; sundry costs and values; measurement of stacks of hay, corn, and straw; compensation for land taken for public purposes; and miscellaneous items as to agricultural products.

The appendix gives a digest of the Agricultural Holdings Act, 1908, with a full text and commentary thereon.

Our farmers and our future, R. H. FORBES (*Univ. Ariz. Rec., 2 (1910), No. 2, pp. 23*).—This is an address delivered October 21, 1909, in a course of public lectures at the University of Arizona, in which it is shown that the cultivated lands in Arizona have increased by reason of irrigation from 5,000 or 10,000 acres to about 230,000 acres within the last 55 years, and that further development of the country is dependent upon the storage of flood waters, the development of underground supplies, the more effective application of water in agricultural operations, and the direct utilization of rainfall.

Agricultural statistics (*Bien. Rpt. Bur. Labor Statis. Colo., 12 (1909-10), pp. 279-291*).—This chapter shows there are between 2,750,000 and 3,000,000 acres under irrigation in Colorado, and gives tables showing the production in 1909 and 1910 per acre of the 5 principal grain crops, including the acreage, bushels, price, and total value of each, and the amount of fruit and sugar production in 1910.

Primary production, J. B. TRIVETT (*Statis. Reg. N. S. Wales, 1910, pt. 7, pp. 577-719*).—A statistical register of New South Wales showing the area, production, and average yield of the principal crops, together with comparative tables giving the average of the various crops and the average value per acre for the several districts and counties from 1900 to 1909, inclusive.

European agricultural returns (*Nyasaland Govt. Gaz., 1909, May 31, Sup., pp. 3*).—A statistical report showing the acreage and estimated tonnage for 1908-9 upon the following agricultural crops in the Nyasaland Protectorate: Cotton, coffee, tobacco, fiber, chillies, tea, wheat, oats, and rice.

AGRICULTURAL EDUCATION.

Agricultural education: Educational periodicals, B. M. DAVIS (*El. School Teacher, 11 (1910), No. 1, pp. 15–23*).—In this number the author discusses in particular the influence of Barnard's *Journal of Education* on the development of agricultural education, and in a more general way 3 groups of educational periodicals: (1) Those devoted to general problems in education and having general circulation, in which the attention given to agricultural education is said to be much less than would seem to be warranted in view of the great public interest in the subject; (2) special periodicals, including those devoted to some single phase of education, as, for example, orthography, penmanship, manual training, etc., among which 2 are mentioned as devoting considerable attention to agricultural education, one in the field of secondary agriculture, and the other in the field of elementary agriculture; and (3) local journals of education, several of which are said to have exerted a strong influence for the promotion of agricultural education. A bibliography of some of the leading articles appearing in educational periodicals is given.

Agricultural education: Periodical literature, B. M. DAVIS (*El. School Teacher, 11 (1910), No. 2, pp. 79–89*).—The importance of popular periodicals is recognized by the author, but he says that "on the whole, agricultural periodicals have maintained too conservative an attitude toward agricultural education, both as to colleges and elementary and secondary schools." As indicating the nature of the work done by popular periodicals a review is given of some of the leading articles on the general subject of agricultural education that appeared in the periodicals of this country in 1903, near the beginning of the active promotion of elementary and secondary agricultural education. Several other articles are also reviewed, and all of these are referred to definitely in a bibliography.

Agricultural education: State organizations for agricultural and farmers' institutes, B. M. DAVIS (*El. School Teacher, 11 (1910), No. 3, pp. 136–145*).—In this contribution to agricultural education the author discusses the influence of state departments of agriculture, state fairs, agricultural contests held under the direction of the state offices of agriculture, and state farmers' institutes. A bibliography of the subject is appended.

Agricultural education: Agricultural societies, B. M. DAVIS (*El. School Teacher, 11 (1911), No. 5, pp. 266–274*).—In this article four periods are recognized in the relation of agricultural societies to the development of agricultural education, viz: (1) The period of beginnings, from 1785–1850; (2) the period of agricultural fairs, from 1850–1870; (3) the period of great organizations, from 1870–1892; and (4) the period of adjustment, from 1892 to the present time. Much credit is given to the early agricultural societies in Pennsylvania, New York, and Michigan for the agitation which led to the establishment of agricultural colleges, and the influence of such societies is recognized in later years as having a bearing on the progress of these institutions, as well as a more or less independent value in promoting agricultural education in the fields not covered by the colleges of agriculture.

Report of the board of education on agricultural education (*Rpt. Mass. Bd. Ed. on Agr. Ed., 1911, pp. 104*).—This report embodies the recommendations of the state board of education of Massachusetts as to an investigation conducted by direction of the legislature on the advisability of establishing a system of public agricultural schools throughout the Commonwealth, and the practicability and desirability of establishing a farm school in the city of Worcester.

Briefly summarized these recommendations are (1) state aid as at present provided for industrial schools to any town or group of towns constituting a district for the establishment and maintenance of an independent agricultural school; (2) the establishment of agricultural departments in existing high schools with state aid and with rigid definition and enforcement of vocational standards; and (3) to meet the needs of Worcester by the foregoing provisions.

The report contains discussions in detail of the following topics: Does Massachusetts farming warrant the establishment of a system of agricultural schools? The system of agricultural schools recommended for Massachusetts; cooperation between school and home farm necessary to an effective system of agricultural schools for Massachusetts; the part-time project method necessary to an effective system of agricultural schools for Massachusetts; the problem of securing competent instructors for a system of agricultural schools in Massachusetts; agricultural departments in public high schools the principal present need in Massachusetts agricultural education; possible locations for agricultural schools or departments; recommendations with regard to agricultural education for Worcester; agriculture as a phase of liberal education in the high schools of Massachusetts; and agriculture as a phase of liberal education in the elementary schools of Massachusetts.

An appendix contains a proposed law embodying recommendations of the board.

Report of the Michigan State Commission on Industrial and Agricultural Education (*Rpt. Mich. State Com. on Indus. and Agr. Ed., 1910, pp. 95*).—This commission was appointed by the Governor of Michigan in the summer of 1909, and organized by appointing subcommittees on industrial and trade schools, child labor conditions, agricultural education, and rural education. This pamphlet contains the definitions, conclusions, and recommendations of the whole committee, reports of the respective subcommittees, a paper on The Present Condition of Industrial Education in Germany, by E. C. Warriner, and three appendixes containing (a) statistics on agricultural high schools in Michigan and Minnesota, rural districts in Michigan, county agricultural schools in Michigan and Wisconsin, and other data; (b) typical courses of study in agricultural high schools, public high schools in Maine, Iowa, Illinois, and Nebraska, and county agricultural schools in Michigan and Wisconsin, industrial courses in a number of cities, and suggested agricultural and industrial courses for Michigan; and (c) authorities, including a list of schools visited and a bibliography.

Among the recommendations of the commission are (1) the provision of at least one high school with a four-year course in each township; (2) the introduction as soon as possible of agriculture, manual training, and home economics into all high schools; (3) certification of all teachers of agricultural and industrial subjects; (4) state supervision of all agricultural and industrial courses, and (5) state aid for schools introducing high school courses in agriculture and home economics, as follows: (a) The total not to exceed $30,000 for the first year, $50,000 for the second year, and $100,000 for any subsequent year, (b) an equal division of the funds between agriculture and home economics on the one hand, and industrial courses on the other, and (c) schools certified for aid in agriculture and home economics to receive $500 for the first teacher employed, and $250 for each other teacher employed, and no school to receive more than $1,000 in all.

Some observations on high school agriculture, L. Anderson (*Nature-Study Rev., 7 (1911), No. 3, pp. 77–79*).—The author discusses schools that came under his observation during an extended trip for the purpose of visiting special agricultural schools and public high schools having agricultural departments. He deals particularly with public high schools in Virginia, New York, Minnesota, Michigan, and California.

Results of boys' demonstration work in corn clubs in 1910, S. A. Knapp and O. B. Martin (*U. S. Dept. Agr., Bur. Plant Indus. Doc. 647, pp. 7, figs. 3*).—The origin of boys' corn club work in connection with the farmers' cooperative demonstration work is traced back to 1906, and a brief review of the development of the movement since 1909 is given.

The number of boys engaged in this work in 1910 was 46,225, and the highest yield on 1 acre was 228¾ bu. grown at a cost of 43 cts. a bushel by Jerry Moore at Winona, S. C. It is stated that in Lincoln County, Miss., 48 boys averaged 92 bu. per acre; in Clarendon County, S. C., 142 boys averaged 62 bu.; in Appomattox County, Va., 17 boys averaged 83.7 bu.; and 100 of the boys in the South made an average of 133.7 bushels per acre.

MISCELLANEOUS.

Annual Reports of the Department of Agriculture, 1910 (*U. S. Dept. Agr. Rpts. 1910, pp. 953*).—This consists of the report of the Secretary and heads of Bureaus. The various reports are also issued as separates. A portion of the report of the Secretary, comprising a discussion of the prices of farm products to the producer and consumer, is abstracted on page 90 of this issue.

Report of the Secretary of Agriculture, 1910, James Wilson (*U. S. Dept. Agr. Rpt. 93, pp. 98*).—This report, which is reprinted in abridged form from the publication noted above, contains a review of the work of this Department for the fiscal year ended June 30, 1910.

Twenty-second Annual Report of Georgia Station, 1909 (*Georgia Stà. Rpt. 1909, pp. 87–96*).—This contains the organization list, reports by the president of the board of directors and by the director of the station on its work during the year, and a financial statement for the fiscal year ended June 30, 1909.

Twenty-third Annual Report of Michigan Station, 1910 (*Michigan Sta. Rpt. 1910, pp. 137–549, figs. 289*).—This contains reports of the director and heads of departments on the work of the station during the year, the experimental features of which are abstracted elsewhere in this issue, reprints of Bulletins 256–261, Special Bulletins 51–53, Technical Bulletins 2–4, and Circulars 6–9, previously noted, and a financial statement for the fiscal year ended June 30, 1910.

Report of the director, 1910, H. L. Russell (*Wisconsin Sta. Bul. 203, pp. 63, figs. 12*).—This contains the organization list, a report of the work of the station during the year, especially those phases dealing with administration, research, publications, and extension work, brief summaries of the publications of the year, lists of donations and exchanges, and a financial statement for the fiscal year ended June 30, 1910.

Monthly Bulletin of the Department Library, February and March, 1911 (*U. S. Dept. Agr., Library Mo. Bul., 2 (1911), Nos. 2, pp. 33–58; 3, pp. 61–90*).—These numbers contain data for February and March, 1911, respectively, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received.

Experiment Station Work, LXII (*U. S. Dept. Agr., Farmers' Bul. 435, pp. 24, figs. 6*).—This number contains articles on the following subjects: Water required for crops on rich and poor soils, burning lime on the farm, growing tomatoes for the canning factory, lime-sulphur as a fungicide, market classes and grades of meat, keeping poultry free from lice, and Neufchatel cheese

NOTES.

Idaho University and Station.—Appropriations have been made of $6,000 for a two-story and basement stock and dairy barn, with a concrete silo and milk room adjoining, a $3,000 stock-judging pavilion of mission style to accommodate 120 students, $13,000 for the purchase of additional land, and $20,000 for extension work in Southern Idaho. A dry-farming substation is to be established in the southeastern part of the State for work in cooperation with this Department.

Illinois University and Station.—A total appropriation of $3,600,000 was made to the university for the ensuing biennium, of which $952,300 is for the college of agriculture and experiment station. Provision was also made for levying a one-mill tax during the next 2 years upon the assessed valuation of the State. The revenues thus derived will constitute a fund from which the next legislature may make detailed appropriations to the institution.

Among the several items granted are $210,400 per annum for maintenance of the college and station, $168,000 per annum for special investigations by the station in live stock, farm crops, soils, orchards, floriculture, and dairying, $19,000 for the purchase of improved live stock, $3,500 for additional equipment for the farm mechanics laboratory, and $153,000 for new buildings. This includes $34,000 for additions to existing buildings and the erection of several small structures; $80,000 towards a live-stock building and large pavilion to cost eventually $100,000; $39,000 for green houses; and $20,000 for the purchase of 40 acres of land for the poultry plant and additional field experiments.

The legislation provides for the inauguration of work in soil biology, poultry, and forestry, and for additional work in veterinary science, landscape gardening, floriculture, animal nutrition, and agricultural extension.

Fred L. Charles, assistant professor of agricultural education since 1909, died at Urbana May 6, at the age of 38 years. Prof. Charles was a graduate of Northwestern University, from which institution he also received in 1895 the M. S. degree. Subsequently he specialized further in biology and zoology at the University of Chicago and elsewhere. His early work in teaching was in public and secondary schools, but in 1899 he became professor of biology at the Northern Illinois State Normal School, where he remained for 10 years, giving special attention to the methods of teaching nature study in the public schoools. His work at the University of Illinois had been largely in the formulation of plans for the introduction of agriculture into the elementary schools of the State, in which field his work was largely of a pioneer nature. At the time of his death he was also editor of *Nature Study Review*.

Louisiana Stations.—George Chaquelin, formerly assistant chemist at the Sugar Station, has been appointed assistant director of the Sugar Station, vice H. P. Agee, whose resignation has been previously noted.

C. O. Moreland and C. B. Sherrouse, 1911 graduates of the university, have been appointed assistants in plant pathology in connection with the researches under the Adams Act.

Plans and specifications for a new residence at the North Louisiana Station for the assistant director have been prepared and bids for construction are being received. The former residence was destroyed by fire in January.

Minnesota University.—The State legislature has granted $1,283,900 to the university, $390,700 for the school of agriculture, $89,200 for the Crookston school of agriculture, $2,109 for the Crookston substation, $15,500 for the Grand Rapids substation, $199,750 for the Morris agricultural school, $65,000 for a substation at Duluth, and $35,000 for one at Waseca.

The extension division received an increase from $25,000 per annum to $40,000, and the farmers' institutes an increase from $18,000 to $23,000. In addition $2,000 was allotted for prizes in the State boys' and girls' industrial contest under the auspices of the extension division. A horse barn was authorized to cost $5,000 and a hog barn to cost $1,500.

New Jersey Stations.—Provision has been made by recent acts of the legislature for carrying on experiments in poultry production and floriculture. Buildings are to be erected for these purposes in the near future.

The State board of agriculture has been authorized to appoint a plant pathologist for the study of chestnut blight of forest trees. He is to cooperate in this work with the State forester. The State entomologist has been authorized to investigate problems pertaining to the foul brood of bees.

North Carolina College.—A commission of five is to be appointed from the State legislature to meet with the State board of agriculture and the trustees of the college for an investigation of the advisability of consolidating these institutions or to arrange for additional cooperation between them.

An appropriation of $30,000 was granted for an animal husbandry building. There was also provided $80,000 annually for maintenance, and $15,000 annually during 1911 and 1912 for permanent improvements.

North Dakota College and Station.—State appropriations aggregating nearly $200,000 have been made for the ensuing biennium. Of this about $112,000 is for the maintenance of the college, $13,600 for that of the school of forestry, $25,000 for that of the 5 substations, and $24,000 for that of the 23 demonstration farms, together with $15.550 for additional buildings and other equipment at the substations.

South Dakota College and Station.—The appropriations by the legislature for maintenance for the ensuing biennium aggregate $131,000. Among the items are $4,000 each for the substations at Eureka and Cottonwood, $6,000 for the Highmore substation, $1,000 for a new substation to be located in Fall River County for dry farming tests, $1,000 for seed testing, $2,000 for the distribution of hardy alfalfas, and $2,000 for popular bulletins.

The grant for farmers' institutes was increased from $10,000 to $26,000. Several new buildings were authorized, including a $100,000 agricultural and administration building, $4,000 for an addition to the creamery building, and $6,500 for buildings at the substation. The establishment of a demonstration farm at Vivian in Lyman County was authorized under certain conditions.

Tennessee University and Station.—The thirty-eighth annual session of the East Tennessee Farmers' Convention, of which the director of the station is secretary, was held at the university May 16–18. The attendance was about 1,500. There were ten speakers from the university and station and a number from other stations and this Department. An inspection of the station farm constituted an important feature of the meeting.

The sum of $6,000 was appropriated from the treasury of the convention to assist in the erection of an assembly hall and live-stock pavilion on the station farm to cost $12,000. Considerable sums have been pledged by individuals and the balance will be supplied subsequently from funds of the convention.

Vermont University and Station.—Dr. Guy P. Benton, president of Miami University, Oxford, Ohio, has been chosen president of the University. G. C. Cunningham, a 1909 graduate of the Ontario Agricultural College and a postgraduate student in plant pathology and bacteriology at the University of Wisconsin, has been appointed assistant plant pathologist in the station and has entered upon his duties. Clarence Carpenter, a 1911 graduate of the university, has been appointed assistant bacteriologist, and P. M. Lombard assistant horticulturist.

A better-farming-special train was recently sent out in northern Vermont. One car was devoted to forestry and horticulture, one to farm crops and fertilizers, one to dairying, and a fourth to agricultural education and home economics.

West Virginia University.—D. W. Working has resigned as superintendent of agricultural extension to accept a position in the Office of Farm Management of this Department.

Agricultural College in British Columbia.—An act of the recent provincial legislature sets aside 170 acres at Point Grey, a Vancouver suburb, for the site of a provincial university, and makes a grant of 2,000,000 acres of public lands for its maintenance. Plans are being formulated for the erection of over 30 buildings. One important group is to be provided for a college of agriculture, with accompanying schools of forestry, domestic science, and veterinary science. A central farm in connection with the college is proposed, as well as several branch farms in the Province.

Agricultural Instruction in Porto Rico.—Instruction in agriculture is now offered by the University of Porto Rico, at Rio Piedras, and by the department of education in 6 of the 41 supervisory districts, the latter being work of an elementary nature. In each of these districts there is a special teacher of agriculture who gives instruction in the graded schools and superintends the work of the rural teachers in that subject. Gardens are maintained in connection with the work and in some instances the sale of the products, such as sugar cane, pineapples, citrus fruits, tobacco, and vegetables, has placed quite a fund at the disposal of the teacher for the purchase of fertilizers, implements, etc. Courses in manual training and domestic science are maintained in the high school and university courses, and courses in sewing to a limited extent in the graded schools.

A New Association of Agricultural Educators.—A conference on secondary agricultural education was held in Chicago April 10. It was attended by representatives of the departments of agricultural education of Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio, the principals of the 3 agricultural schools in Minnesota, and the specialists in agricultural education of the New York State Department of Education, the United States Bureau of Education, and this Office.

Among the topics discussed at the conference was the number of units feasible to be taught in high schools having special teachers of agriculture, in consolidated rural or graded schools, and in one-room rural schools. As regards the number of units in the four-year high school course it was voted as the consensus of opinion that, if a special teacher of agriculture is provided, four years of agriculture are feasible and desirable. There was also considerable discussion of the scope of rural school nature study and of ways and means of securing up-to-date information on agricultural education. A resolution was adopted requesting the cooperation of the United States Commissioner of Education and the Director of the Office of Experiment Stations in the collecting of such material.

It was voted to form a permanent organization and K. L. Hatch, of Wisconsin, was elected president, and W. H. French, of Michigan, secretary-treasurer, with power to decide upon a name for the association and arrange for subsequent meetings. The president has suggested the name of The American Association for the Advancement of Agricultural Teaching.

Elementary Agricultural Education in South Carolina.—The seventh annual report of the commissioner of agriculture, commerce, and industries of South Carolina includes a report of a special commission appointed by the general assembly of South Carolina to investigate and report upon the advisability of establishing and maintaining agricultural schools and branch experiment stations in the State.

In this report the commission enumerates the various forces at work in South Carolina to improve agricultural methods, and recommends that instead of establishing separate agricultural high schools the State create a commission on agricultural education, to consist of the state superintendent of education, the commissioner of agriculture, one member of the board of trustees of Clemson College, the director of the agricultural department of the college, the professor of secondary education of the University of South Carolina, and the professors of elementary agriculture and elementary education at Winthrop College. This commission would be charged with making and executing general plans for agricultural education in South Carolina, including the appointment of a director of agricultural education, who should be an officer of the state department of education, and may be a professor in Clemson College. The duties of this officer, as outlined by the commission, would be to coordinate and harmonize all of the forces now directed toward agricultural education in the schools of the State, prepare and distribute among the schools special bulletins outlining definite work to be done, give specific directions to teachers of agriculture, distribute seeds to schools, and perform such other duties as the commission may direct.

The commission also recommends that special courses designed to prepare teachers of agriculture for the elementary and secondary schools be offered by Clemson College, Winthrop College, and the state university, and that teachers who have thus prepared themselves to teach agriculture and who have received the proper credentials for such work should receive from the state appropriation a small compensation in addition to the salary paid by the district trustees.

Under this plan the work to be done by the director of agricultural education and the commission on agricultural education is to be supported by state appropriations.

Industrial Education in Maine.—The report of the Maine state superintendent of public schools for 1910 contains the report of the committee on investigation of industrial education appointed by the state superintendent in accordance with a resolve passed at the 1909 session of the legislature. Their report deals with industrial (including agricultural) education in European countries and in America, a synopsis of typical state laws regarding industrial education, the present status of industrial education in Maine, and the needs of Maine industries, with recommendations with reference to the preparation of special teachers, the elementary schools, agricultural education, secondary schools, continuation courses, separate trade schools, and the control of industrial courses.

The committee recommends among other things the introduction of hand work, including drawing, manual training, and domestic science, into all grades of elementary schools; greater emphasis on the local geography, history, and industries, and the direction of all school work toward the experiences of the child; school and home gardens; courses for training teachers in agriculture, manual training, and domestic science; encouragement by the State of courses in agriculture, manual training, and domestic science, in public high schools and academies; evening continuation courses in manufacturing and industrial centers; and permissive legislation for the establishment of separate trade schools.

New Journals.—*The American Review of Tropical Agriculture* is being published monthly as the official organ of the Rubber Planters' Association of Mexico. The late Pehr Olsson-Seffer, Ph. D., has been its editor, with headquarters at Mexico City, and the board of associate editors has included Prof. C. F. Baker, of Pomona College, the late J. B. Carruthers, of Trinidad, E. B. Copeland, Ph. D., of Manila, R. M. Olsson-Seffer, of Leland Stanford Jr. University, F. E. Lloyd, of the Alabama College and Station, and others. Its object as announced is to disseminate throughout North and South America the latest experiences of science and practice in tropical agriculture in all the various branches. One of the recent numbers contains an account by the editor of rubber and coffee growing in the Orient and in Mexico; an article on The Growing of Guayule in Relation to the Soil, by J. E. Kirkwood; articles on The Flow of Latex in Rubber Plants and Agricultural Possibilities in Tropical Mexico, by the editor; Causes of Destruction of Agricultural Land in Mexico, by R. I. Olsson-Seffer; a bibliography of rubber, reviews of current literature, book reviews, and miscellaneous notes.

The Agricultural Journal of the Companhia de Moçambique is published quarterly in English and Portuguese, being edited by the Director of Agriculture assisted by the staff of the Agricultural Department of Mozambique. It is designed especially as a medium of communication between the department and the farmers and planters of the country, to whom it is distributed free of charge. The initial number contains a variety of material, including an article on maize cultivation at M'Zimbiti experimental station, notes on the coconut beetle, official notices, statistical data, etc.

The student body of the College of Agriculture, Los Banos, P. I., is issuing *The Philippine Agriculturist and Forester.* It appears monthly during the college year and the initial numbers contain descriptions of the work of the college, general articles designed to improve the agriculture of the islands, abstracts of agricultural literature, etc.

The Nebraska State Horticultural Society has established *Nebraska Horticulture* as its official organ. The initial numbers contain a variety of brief articles including several by members of the staff of the Nebraska University and Station.

Miscellaneous.—The Cuban government offers a prize of $30,000 to the individual who discovers the cause, cure, or means of control of the coconut disease that is destroying many of the trees in that country.

Dr Pehr Olsson-Seffer, formerly instructor in botany in Leland Stanford Jr. University, and recently director of the Tezonapa Botanical Laboratory and botanist of the Mexican Government, was recently killed in Mexico, at the age of 38 years.

Horace G. Deming of the University of Wisconsin has been appointed associate professor of agriculture in the Philippine College of Agriculture.

EXPERIMENT STATION RECORD.

VOL. XXV. AUGUST, 1911. No. 2.

One by one those who took part in the beginnings of agricultural experimentation in this country pass away. Sturtevant, Johnson, Goessmann, Cook, Atwater—these belong to the first generation of workers in agriculture. The men of their time have largely given place to a second generation, now in the full vigor of middle life, who with the greater opportunity which the times afford, in experience, funds, and popular appreciation, are throwing their whole lives into the advancement of agriculture as an industry and as a condition under which men live.

Dr. E. B. Voorhees, of New Jersey, was a type of this present generation of leaders. In a sense he was a link between the old and the new régime, for he was trained under the pioneers, and his most notable work was done since the experiment station movement became a national one. He represented in a characteristic way the vigor and aggressiveness of the new generation in organizing and propagating experiment station work, and in making its results felt by the farmers. He shared generously in the confidence and appreciation which have come of such effort, and in the demand for leadership which this agricultural awakening has brought. He was a product of his times, the embodiment of a new idea.

His life was not a long one, as the world measures time, but it was crowded full. In its fifty-five years there was more of life and accomplishment than in the three score and ten of many another man.

Edward Burnett Voorhees was born at Minebrook, Somerset County, New Jersey, on June 22, 1856. He died June 6, 1911.

He was graduated from Rutgers College in 1881 with the degree of bachelor of arts, and in 1900 he received the honorary degree of doctor of science from the University of Vermont. The year following his graduation he served as assistant to the professor of chemistry at Wesleyan University, Prof. W. O. Atwater; and in 1882 he returned to New Jersey as assistant chemist in the experiment station. This station, the third or fourth in seniority of American stations, had been established two years previously, and was under the directorship of Dr. George H. Cook. Doctor Voorhees continued as assistant chemist until 1888, when he was made chemist. Following the death of Doctor Cook he was appointed professor of agriculture in Rutgers College, in 1890, a position which he held for twenty years, developing agricultural instruction in that institution almost from the beginning, his efforts being crowned with a good measure of success and leading the State to the establishment of the short courses in agriculture.

In 1893 Doctor Voorhees was made director of the New Jersey State Station, and three years later the directorship of the College Station was combined with this. Under his hand the inspection work of the stations was put upon a high plane of efficiency and usefulness, and the research and experimental work were developed in accordance with definite plans and an intelligent understanding of the needs of the State. He inspired and assisted his coworkers in the station, providing for them opportunity and suitable conditions for their studies, and securing recognition for what they accomplished. He was director in a true sense, maintaining sympathetic and helpful relations with the men of his staff, and a vital connection with the principal lines of investigation.

As an independent investigator he was versatile, resourceful, clear in aim and purpose, and quick to see the practical applications of his experiments. Indeed, these were conceived for the most part with the primary object of throwing light on practical every-day questions, for however deep his interest in the science of agriculture, the art and the problems of the men engaged in it were never lost to his sight.

He carried on an elaborate series of studies on nitrogenous fertilizers, the first ten years' results of which were summarized in Bulletin No. 221 of the New Jersey Stations. A review of this work was also presented at the International Congress of Applied Chemistry in London in 1909.

More recently, in collaboration with Doctor Lipman, he had given special attention to investigations in soil chemistry and bacteriology. The New Jersey Station was a pioneer in the latter branch, and although its example has been followed by other stations it has remained a leader in that line. The department sprang from Doctor Voorhees's initiative and his ability to perceive the important bearings of the subject. Its establishment and development on so high a plane is one of his most conspicuous accomplishments. In 1902 he was awarded the Nichols medal by the New York Section of the American Chemical Society, for the best paper embodying the results of original chemical research submitted during the year. The contribution on which this award was made was based on work conducted in the new department, and was entitled Studies in Denitrification.

Doctor Voorhees was a pioneer in teaching the farmers the practice of home mixing of fertilizers, to economize cost and secure suitable mixtures for different purposes. He was an ardent champion of honest goods, and waged an aggressive campaign against the incorporation of materials which his experiments showed to be inert and of little agricultural value. He called sharp attention to the difference which may exist between commercial and agricultural values, especially in case of different forms of nitrogenous manures. His reports on the fertilizer inspection were full of vigor and life, and contained deductions and suggestions which were interesting and helpful to the practical man in drawing conclusions from the tables of figures.

With remarkable energy and enthusiasm Doctor Voorhees encouraged and promoted the diversification of agriculture in his State, the introduction of new crops, and the establishment of new branches of farming. The system of soiling crops for dairy cattle which he worked out and demonstrated at the station farm was an example in intensive farming under which the purchase of expensive grains was greatly reduced. The home growing of protein was a popular theme with him. The successful establishment of alfalfa in New Jersey is a direct result of his experiment and teaching. It is estimated that a thousand acres were seeded to this crop last fall. He gave special study to the waste or poor soils of the State and their utilization for profitable farming; and at one time he devoted considerable attention to the use of irrigation as an adjunct in the humid regions.

These things illustrate the versatility and breadth of interest of the man, and show how quick he was to perceive a need and to seek means of meeting it. It was this breadth and quick perception, his clearness of purpose and energy in setting work in motion, that constituted one of his strongest attributes as a station director.

Doctor Voorhees was identified with many scientific societies and organizations, in whose work he shared. For many years he took an active part in the study of methods of analysis conducted by the Association of Official Agricultural Chemists, and he was president of that organization in 1893–94. For seven years (1897–1904) he was secretary-treasurer of the Association of American Agricultural Colleges and Experiment Stations, and was president of the association in 1904–5.

His connection with the State Board of Agriculture was especially noteworthy. He served as vice-president of that board from 1893–1901, and was its president from that date to the time of his death, giving a large amount of attention to its interests and activities. He was president of the Board of Directors of the New Jersey Weather Bureau in 1893, president of the New Jersey Microscopical Society 1905–6, and a leader on the State Conservation Commission.

> "In the rapid movement of agricultural science in an unknown and then but lowly place, to its present lofty place among the sciences of the schools and of the national life, he thus bore his worthy and far from inconspicuous part."

The broad educational influence of an agricultural teacher is not to be measured merely by the hours spent in the class room or the number of students which come directly under him. His contributions to the advancement of knowledge, his influence in the promotion of worthy educational ideals, and his dissemination of useful knowledge among mankind, must receive due weight of consideration.

This is notably true in the case of Doctor Voorhees. He rendered a far broader service to higher education in agriculture than the teaching of the students who attended his classes. One of the fundamental things in the development of the American system of agricultural education has been the provision of textbooks and manuals for different grades of instruction. As a thoroughly trained scientist, devoting himself especially to studies in plant nutrition and the theory and practice of manures and fertilizers, Doctor Voorhees brought together the results of his studies and experience as a teacher in what is the standard American text-book on fertilizers, which has passed through eleven editions. This has been used by a large number of students in the college courses in agriculture. He was also the author of an important manual on forage crops, and contributed to the Encyclopedia of American Agriculture standard articles on fertilizers, green manures, and cover crops.

In a lower range of educational effort his book entitled First Principles of Agriculture has had an important part in helping on the now widespread movement for secondary education in agriculture. To this class would also belong the Book of Corn, in the preparation of which he was a collaborator.

As a teacher of men actually engaged in agriculture throughout New Jersey and in many other States, Doctor Voorhees was among the foremost workers in the cause of what has come to be called extension in agriculture. He had a rare combination of scientific accuracy with sound practical judgment, and a method of presentation of the subject to practical minds which was very attractive and convincing. He was trusted by practical men as a wise and safe leader, and there were many evidences of the high appreciation in which his aid was held.

Doctor Demarest has well said of him: "A supreme characteristic was his devotion to work, his incessantness in the affairs of his vocation. His interests were many and wide; his chosen calling brought him into manifold relations, many communities of men, many places of responsibility, many circumstances of demand. Any of them as an exclusive work might have commanded his energy of all the days and years; each of them commanded its place, and its degree of his care and effort, and the record of any week or month showed his versatile and unremitting zeal. The world's work was his work and he cast in all his living. He did the full day's work without measure. . . .

"His was a rare enthusiasm. He burned with devotion to the cause to which he gave his life. An ardent belief in the resources and opportunities with which he had to do urged him on, inspired his far-reaching effort, and became the prophecy of great accomplishments. He was ambitious and confident and courageous. . . .

"Out from the college and station center his work, and his personality pervaded the State and even played their part in the life and progress of the nation. In the most material way the resources of the State were in far degree developed by that which came forth from his brain and hand. . . . It was his custom to go ceaselessly about the State, and his visits to communities and clubs were a vigorous campaign of scientific truth. Thus not only were great and continuous material results achieved, but as well a singular personal influence was created and wrought widely for good.

"This singular hold upon the people and service of them was recognized in many appointments by the State itself and by organizations within its bounds. Such official places were not only the consequence of his unusual activities and acceptance, but the vantage point for still more effective work for the public good. His counsel was always sought and respected; he it was who largely shaped policies, formulated plans, and guided the movements of such enterprises.

"It is difficult to measure the reach of such a life; but it is safe to say that there are few men in the life of the State who have been more warmly regarded, more surely trusted, and more plainly followed than he."

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Chemical-technical analysis, G. LUNGE, E. BERL ET AL. (*Chemisch-technische Untersuchungsmethoden. Berlin, 1910, vol. 2, 6. ed., rev. and enl., pp. XVI+869, figs. 138; Sup. pp. 8*).—This is the second volume of the work previously noted (E. S. R., 22, p. 508), and deals with physical, mechanical, and chemical methods for the analysis of cyanogen compounds, clays, glass, cement, water, sewage, soils, air, iron and other metals, calcium carbid, and acetylene.

Method for estimating nitric acid, O. ANGELUCCI (*Abs. in Chem. Ztg., 34 (1910), No. 112, p. 994*).—In this method from 0.2 to 0.5 gm. of the substance is mixed with 3 gm. of fused and powdered lead chromate. The mixture is then put in a porcelain boat and inserted in a combustion tube which is open at both ends. On one side of the tube are placed successively a 30 cm. layer of metallic copper, copper oxid (15 to 20 cm.), and a copper netting (5 to 6 cm.), and it is then connected with an azotometer (nitrometer). Carbon dioxid is passed through the apparatus with a capillary tube, and when the air has been displaced the combustion tube is heated to from 400 to 500° C. The nitrogen oxid vapors formed are reduced by the metallic copper, and the pure nitrogen is collected and measured in the azotometer.

A simple method for the estimation of potassium, A. GRETE (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 1 (1910), No. 5, pp. 295–297; abs. in Chem. Ztg., 34 (1910), No. 117, p. 1040*).—This is a simplification of the Finkener-Neubauer method (E. S. R., 12, p. 714), and consists of boiling 20 gm. of the air-dry substance in a liter bottle until solution has taken place. Sodium hydroxid and ammonia are then added until all the precipitable substances are thrown down and the reaction is slightly alkaline toward phenolphthalein. The mixture is cooled and filled up to the mark with water, and the precipitate allowed to settle.

A measured quantity of the clear fluid is evaporated to dryness in a beaker (resistant glass), and if necessary with the addition of a little sodium hydrate to remove the remaining ammonia. If amids are present these are broken down with a little sodium hypochlorite or chlorin water, and where much organic matter is in the mixture this is oxidized in a platinum dish with a little sulphuric acid. The residue is acidified with hydrochloric acid, treated with an excess of platinic chlorid, and evaporated to a small bulk. In order to wash the potassium platinic chlorid thoroughly and remove the sulphates and chlorids which may be present, the residue is taken up with a little water, 100 cc. of 96 per cent alcohol added, and shaken. The precipitate formed is collected in a Gooch crucible by the aid of suction, washed several times, dissolved in water, and magnesium chips and sulphuric acid added to reduce the platinum. The mixture is then filtered through a Neubauer-Gooch crucible

(E. S. R., 21, p. 710), and the filtrate treated in the usual manner for determining potash.

The estimation of potassium as potassium platinic chlorid, H. FRESENIUS (*Österr. Chem. Ztg., 13 (1910), No. 24, pp. 304, 305*).—The author sought to determine the influence which various salts exert upon the results of the estimation of potassium as potassium platinic chlorid in a solution of potassium chlorid.

The work shows that where much calcium chlorid is present with potassium chlorid and sodium chlorid, and is not previously removed, the results for potassium are high. The same was found to be the case for potassium in admixture with sodium, magnesium, and barium chlorids.

The tests made to determine the proper strength of alcohol for this work showed that 70 per cent alcohol gave low results and 85 per cent high results, while 95 per cent alcohol gave good results for the potassium oxid but with evidences of a possibility of reducing the sodium chlorid to the oxid state. A concentration of 80 per cent alcohol is deemed the best.

Estimation of phosphoric acid by direct weighing of the ammonium phospho-molybdate, N. VON LORENZ (*Österr. Chem. Ztg., 14 (1911), No. 1, pp. 1–5*).—This article deals with the question of the priority of this method (E. S. R., 13, p. 14) and criticizes Jörgensen's findings with a similar method (E. S. R., 19, p. 506). The method is again described in detail and its application for slag, soils, and ashes is discussed.

The titrametric estimation of phosphorus in small amounts, L. T. BOWSER (*Amer. Chem. Jour., 45 (1911), No. 3, pp. 230–237*).—"The method, briefly stated, is as follows: Use a convenient volume of solution, but see that when ready for precipitation it is not less than 20 cc. For less than 0.8 mg. P_2O_5 use 1 cc. molybdate solution, for more 1.5 cc. and 0.5 gm. ammonium nitrate, precipitate at 55° C., keep for 1 hour at that temperature, let stand for 2 hours, filter and wash. Titrate with a standard hydroxid solution not stronger than 0.02 N."

Determination of the basicity of Thomas slag powder, R. MICHEL (*Chem. Ztg., 34 (1910), No. 93, p. 830; abs. in Chem. Abs., 5 (1911), No. 1, p. 51*).—The author proposes heating 1 gm. of the powder with about 15 cc. of 20 per cent ammonium nitrate solution in a 200-cc. round-bottom flask. The ammonia is then driven off by means of air which has been previously passed through sulphuric acid, and which is allowed to bubble through the mixture for three-quarters of an hour. The ammonia is caught in an excess of tenth-normal acid solution. A blank experiment conducted without slag powder liberated no ammonia.

Biochemical handbook, edited by E. ABDERHALDEN (*Biochemisches Handlexikon. Berlin, 1911, vol. 5, pp. VI+674*).—This volume treats of the alkaloids, animal poisons, products of internal secretions, antigens, and ferments.

Action of the metallic salts of the gold group upon the saccharification of starch by the amylolytic ferments, C. GERBER (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 4, pp. 139–145*).—Cadmium, chlorid, zinc chlorid and sulphate, silver nitrate, and mercuric chlorid were studied in regard to their effect upon the action of starch ferments.

A glucosid from Tephrosia purpurea, G. CLARKE, Jr. and S. C. BANERJEE (*Jour. Chem. Soc. [London], 97 (1910), No. 575, pp. 1833–1837; abs. in Zentbl. Biochem. u. Biophys., 11 (1910), No. 1, p. 8*).—From an alcoholic solution or extract of this legume, the authors isolated a glucosid which on hydrolysis yields quercetin, rhamnose, and glucose, and possesses the formula $C_{27}H_{30}O_{16}+3H_2O$.

Determining the enzymatic activity of nuclease by the optical method, G. PIGHINI (*Ztschr. Physiol. Chem., 70 (1910), No. 2-3, pp. 85-93, figs. 14*).—The author at first utilized the various chemical methods for this purpose, but the results obtained were not entirely satisfactory. He contrived a method based upon an observation made by Jones,[a] who found that nucleic acid rotates the plane of polarized light to the right. The method gave good results.

Micropolarization, E. FISCHER (*Ber. Deut. Chem. Gesell., 44 (1911), No. 1, pp. 129-132, figs. 2*).—A description of the method and apparatus used for the polarization of small amounts of substance.

Detection of nitrogen in organic substances, H. R. ELLIS (*Chem. News, 102 (1910), No. 2655, p. 187; abs. in Chem. Abs., 5 (1911), No. 1, p. 75*).—The organic body is heated on porcelain or platinum in a test tube with metallic magnesium and either sodium or potassium carbonate. Compounds which contain nitrogen and carbon yield cyanogen, while those containing halogens and sulphur form halogen salts and sulphids.

A new method for determining pentosans by the aid of the copper reduction method, J. T. FLOHIL (*Chem. Weekbl., 7 (1910), No. 51, pp. 1057-1063*).—The method is based on the determination of the reducing power of the furfurol in the distillate, which is obtained in the usual manner.

Food codex of the Netherlands.—IV, General methods for the analysis of various foods of vegetable origin, A. J. J. VANDEVELDE (*Rev. Gén. Chim., 13 (1910), Nos. 19, pp. 307-313; 21, pp. 325-330*).—Among the topics treated in this part are the qualitative and quantitative reagents and methods for determining water, ash and ash constituents, fat, protein, and carbohydrates in foods.

Serodiagnostic methods, J. THÖNI (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 1 (1910), No. 4, pp. 175-187; abs. in Chem. Ztg., 34 (1910), No. 115, pp. 1024, 1025*).—A general discussion in regard to the use of biological methods for detecting food adulterations.

Fat estimation in meat, G. DIESSELHORST (*Arch. Physiol. [Pflüger], 134 (1910), No. 9-10, pp. 496-500*).—A comparative study was made between the Lehmann ball mill method[b] and Dormeyer's pepsin hydrochloric acid digestion method (E. S. R., 7, p. 919) for estimating fat. The results show that Dormeyer's method extracts other bodies in addition to fat, whereas the results obtained by the Lehmann method gives constants which are typical for fat.

Utilizing the anaphylaxis reaction for detecting meat adulteration, H. MIESSNER (*Centbl. Bakt. [etc.], 1. Abt., Orig., 56 (1910), No. 2, pp. 163-177*).—It appears from the results that when a guinea pig is treated with heterologous antigens it becomes anaphylactic to both of the antigens, but that the test with one of the two antigens has no influence on the other antigen.

It is also possible to detect antigens (proteins) which have been boiled. An interval of from 40 to 50 days from the last injection is the best time to test for the presence of raw and boiled meats. The methods used are discussed.

Biological method for detecting the presence of horse fat in other animal fats, WITTELS and WELWART (*Seifensieder Ztg., 37 (1910), p. 1014; abs. in Chem. Zentbl., 1910, II, No. 16, p. 1249; Analyst, 35 (1910), No. 417, p. 527*).—The test depends upon the differentiation of the proteins contained in the various animal fats by the biological precipitin reaction (E. S. R., 22, p. 689).

Determining coco fat in lard with the aid of the ethyl-ester number, J. HANUŠ and J. THIAN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 12, pp. 745-749*).—The authors once more (E. S. R., 18, p. 811) point out the value of the ethyl-ester figure for detecting the adulteration of lard with foreign fats. The method is again described.

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[a] Jour. Biol. Chem., 5 (1908), No. 1, pp. 1-26, dgms. 7.

[b] Arch. Physiol. [Pflüger], 97 (1903), No. 11-22, pp. 606-633, figs. 4.

Determining the dry matter content of potatoes, H. Björn-Andersen (*Tidsskr. Landbr. Planteavl., 17 (1910), No. 3, pp. 510–528*).—This is a critical study of the methods of Heideprim, Holdefleiss, Adesser, Maercker, and A. J. Hansen for obtaining the percentage of dry matter in potatoes from the specific gravity, and supplemented by the author's work, which included determinations of both the dry matter and specific gravity of a large number of samples of 15 different varieties of potatoes. The conclusion is reached that an error of at least 1 per cent is frequently made by calculating the dry matter content from the specific gravity of the potatoes, and that where greater accuracy is called for, direct determinations of dry matter should be made.

The chemistry of bee honey, A. Hasterlik (*Leipzig. Bienen Ztg., 26 (1911), Nos. 2, pp. 24–28; 3, pp. 40, 41*).—This is a review of the progress made in the chemistry of bee honey during 1910.

Honey and its analysis, F. Muttelet (*Ann. Falsif., 3 (1910), No. 26, pp. 503–513*).—A general discussion of honey standards and the adulteration of honeys, particularly those honeys obtained by feeding bees with sugar and giving Fiehe's reaction (E. S. R., 20, pp. 612, 909, 1009). The author makes it a practice to conduct his honey examinations organoleptically, microscopically, polariscopically, and chemically.

Analysis of honey, G. Cuertel (*Ann. Falsif., 3 (1910), No. 26, pp. 497–502*).—A description of the usual methods for estimating and standards for protein, invert sugar, moisture total solids, acidity, ash, and chlorids, as well as of Lund's method for albumin (E. S. R., 21, p. 303), Fiehe's reaction, Ley's reaction, the polarization before and after inversion, and tests for glucose and dextrin.

Determination of gum in gum sirups, Bellier (*Ann. Falsif., 3 (1910), No. 26, pp. 528, 529*).—This method is based on the principle of precipitating the gum with alcohol in the presence of such salts as barium chlorid, magnesium chlorid, and calcium chlorid. Preference is given to the calcium salt.

The shell and germ content of cocoa products, H. Huss (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 2, pp. 94–101*).—After reporting the results of factory tests in regard to freeing cocoa products from the shell and germ, the author propounds the question as to what would be a fair limit for these substances. He lays particular stress on the elimination of such terms as traces, small amounts, etc., and sets the limit for cocoa mass at 2 per cent, for chocolate at 1 per cent, and for cocoa at 3 per cent.

A microscopic method is also described for obtaining approximate quantitative figures for the shell and germ content of these products. This is based on the fact that the mucus cells of the shell and the germ tissue do not take a stain composed of (1) Congo red 1 gm. and water 100 gm.; (2) brilliant blue 1 gm., glycerin 20 gm., and water 80 gm.; and (3) Sudan glycerin, consisting of Sudan III 0.1 gm., glycerin 50 gm., and alcohol (95 per cent) 50 gm. The samples which are to be examined are compared with other authentic samples of known shell and germ content. Milk fat and other normal substances which may be present are stained by these reagents.

Estimation of citric acid in citrates and lemon juices, M. Spica (*Chem. Ztg., 34 (1910), No. 128, pp. 1141, 1142, figs. 2; abs. in Analyst, 35 (1910), No. 417, p. 519*).—The method is based upon the precipitation of citric acid as calcium citrate, heating this with sulphuric acid, and measuring the carbon dioxid which is driven off. The carbon dioxid has a direct relation to the amount of citric acid present.

A new method for the analysis of wine, Friderich (*Monit. Sci., 4. ser., 24 (1910), II, No. 827, pp. 705–710, figs. 7*).—After discussing the physical-chemical principles underlying the method, the author describes the method in detail, as previously noted (E. S. R., 19, pp. 913, 1110; 20, p. 708).

Detection of saccharose in wine, F. SCHAFFER and E. PHILIPPI (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 1 (1910), No. 5, pp. 294, 295; abs. in Chem. Ztg., 34 (1910), No. 117, p. 1040*).—Numerous sugared, artificial, and authentic natural wines and some grape juices prepared by the authors were examined according to Rothenfusser's method (E. S. R., 22, p. 10). The results show that the blue coloration obtained with hydrochloric acid and diphenylamin is probably the result of the formation of oxymethyl furfurol from the sugars and these reagents. Orcin, according to the authors, is an even more sensitive reagent.

The chemical examination of hops, L. KUNZ (*Pure Products, 7 (1911), No. 1, pp. 39–44*).—The author describes a quick method for estimating the bitter substances in hops, which has for its purpose the control of the amount of hops to be added to beers in order to produce a uniform bitter for every brew.

A new method for examining pepper, C. ARRAGON (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 1 (1910), No. 5, pp. 271–273; abs. in Chem. Ztg., 34 (1910), No. 117, p. 1040*).—Pepper, according to the author, possesses a very constant iodin number. He states that when 2 gm. of pepper are treated in the same manner as fat when estimating the iodin value according to Hübl, a value is obtained which, when calculated to 100 gm., is in the neighborhood of 17. If starch is present, this figure is reduced.

The detection of olive husks in pepper, F. BONDIL (*Ann. Falsif., 4 (1911), No. 27, p. 36*).—The test is based on the coloration of the stone cells by a fresh solution of paraphenylendiamin and a few drops of acetic acid. The test can also be used for detecting sawdust in flour, bread, etc.

Estimation of reducing sugars in vinegars, F. F. HASBROUCK (*Pure Products, 7 (1911), No. 2, pp. 80, 81*).—A discussion in regard to inaccuracies in determining the reducing sugars in vinegars and a description of a good procedure for this purpose is given.

The bacterial deterioration of sugars, W. L. OWEN (*Louisiana Stas. Bul. 125, pp. 88, figs. 30*).—A biochemical study of the bacterial deterioration of sugars.

According to the author the deterioration is caused by the group of bacteria which comprises the potato group of bacilli. The spores of the species isolated causing the deterioration of sugars were found to be very resistant to heat and capable of surviving the various processes of sugar manufacture. The actual destruction of sucrose is due to an extracellular gum- (levan) forming enzym, which the author terms "levanase." It produces the changes according to the following equation: $C_{12}H_{22}O_{11}=C_6H_{12}O_6+C_6H_{10}O_5$, and acts best in a slightly alkaline medium.

The author also points out that the formation and presence "of levan in sugars introduces an error in both the single polarization and Clerget methods of determination of sucrose. This error causes a decrease in the single polarization of 0.6 Ventzke for every 1 per cent of levan, and an increase of 0.67 Ventzke for Clerget in the presence of 1 per cent of gum. Owing to this factor of error, a sugar in which gum formation has taken place would show an increase in sucrose by the Clerget method of determination."

A bibliography of 30 titles is appended.

Extraction of grains and cattle foods for the determination of sugars: A comparison of the alcohol and the sodium carbonate digestions, A. H. BRYAN, A. GIVEN, and M. N. STRAUGHN (*U. S. Dept. Agr., Bur. Chem. Circ. 71, pp. 14*).—This is a description of a quantitative extraction method for determining the sugar contained in grains, cattle feeds, and vegetable materials, which has already been mentioned (E. S. R., 19, p. 840) and used in work previously described (E. S. R., 22, p. 238).

In detail it is as follows: "Place 12 gm. of material in a 300 cc. graduated flask,[a] add 150 cc. of 50 per cent alcohol by volume (carefully neutralized), mix thoroughly, and boil on a steam bath for 1 hour, using a small funnel in the neck of the flask to condense the vapor. Then cool. If desired, allow it to stand overnight. Make up to volume with 95 per cent alcohol (neutral in reaction), mix thoroughly, allow to settle, transfer 200 cc. to a beaker with a pipette, and evaporate on steam bath to a volume of from 20 to 30 cc. The presence of a trace of alcohol is not harmful. Do not evaporate the solution to dryness. (By evaporating the 200 cc. portion in a short-necked, ballon-shaped distilling flask, connected with a condenser, 75 to 80 per cent of alcohol can be recovered before the material in the flask foams violently. The short neck—1 in.—of these flasks makes it possible to remove the residue easily. The 100 cc. remaining in the digestion flask may be strained through a cotton bag and the alcohol recovered from the liquid as just described. This is easily accomplished and results in a marked saving when a large number of samples are run.) Transfer the contents of the beaker or flask, as the case may be, to a 100 cc. graduated flask, washing thoroughly with water. Add enough of a saturated solution of neutral lead acetate to produce a flocculent precipitate and allow to stand 15 minutes.

"At this point the solution may safely stand overnight if desired. Make up to the mark with distilled water and pass through a folded filter, carefully saving all of the filtrate, to which add enough anhydrous sodium carbonate to precipitate all the lead, allow to stand 15 minutes, and pour onto an ashless filter. Over 75 cc. of filtrate should be obtained. Test the filtrate for lead with a small quantity of dry sodium carbonate, and if any precipitation occurs add more anhydrous sodium carbonate and refilter. Use 25 cc. of this clear filtrate together with 25 cc. of water for the determination of reducing sugars by the method of Munson and Walker. In a 100 cc. graduated flask, place 50 cc. of the same filtrate, add a small piece of litmus paper, and neutralize with acetic acid; then add 5 cc. of concentrated hydrochloric acid and let stand overnight for inversion. (Standing 48 hours does not apparently affect the results.) Then pour the inverted solution into a 400 cc beaker and neutralize with anhydrous sodium carbonate; return it to the 100 cc. flask and make up to the mark. Filter, if necessary, and use 50 cc. for the determination of total sugars as invert by the method of Munson and Walker.

"The amount of cuprous oxid or copper obtained in either the reducing or the total sugar determination represents the sugar contained in 2 gm. of the material. Therefore the weights of the invert sugar when divided by 2 and multiplied by 100 give the respective percentages of sugar as invert. Subtract the percentage of reducing sugars before inversion from the percentage of total sugar after inversion, both calculated as invert, and the difference multiplied by 0.95 gives the percentage of sucrose. Since the insoluble material of the grain or cattle feed occupies some space in the flask as originally made up, it is necessary to correct for this volume. Results of a large number of determinations on various materials have shown the average volume of 12 gm. of material to be 9 cc.; therefore the correction factor for 12 gm. in 300 cc. is 0.97, and the percentage figures for reducing sugar and sucrose are to be multiplied by this factor to obtain the true amounts."

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[a] If the material is acid in reaction, it would be well to add from 1 to 3 gm. of precipitated calcium carbonate to neutralize the acidity.

A comparative study of this method and the sodium carbonate aqueous extraction method was made, utilizing various kinds of material. It showed that the alcohol method gave lower but satisfactory and comparable results, and it made no difference whether the extract was analyzed immediately or after standing for some time.

The authors point out that in order to obtain true and concordant results with the sodium carbonate method careful attention must be given to some of the details of manipulation, as, for instance, "after neutralizing the sodium carbonate by clarifying with alum or lead, the work must be carried on with dispatch as the enzyms again become active; the acidity of the sample must be determined and the quantity of sodium carbonate thereby regulated, or the accuracy of the results will probably be affected; normal lead acetate should be used instead of alum for clarification under most circumstances, otherwise an error is introduced."

The authors express the opinion that the alcohol method is to be given the preference for general sugar work, but that where a long series of comparable results are necessary the sodium carbonate aqueous method may sometimes be used to advantage.

The estimation of total solids in milk by the use of formulas, R. H. Shaw and C. H. Eckles (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 134, pp. 31, fig. 1*).—This work forms a part of investigations concerning milk which are in progress in cooperation with the Missouri Station. It was carried out for the purpose of testing the accuracy of various formulas in common use (Babcock's, Richmond's, and Fleischmann's) for determining the total solids in milk, and to determine whether an improvement could not be made in the way of obtaining an easy, accurate method for determining the specific gravity of milk for the use of such men as usually have charge of official testing.

With the above objects in view, the authors compared the percentages of total solids calculated by means of formulas and of total solids found by the gravimetric method. They further compared the formula whose results came closest to the gravimetric figures, under very exacting conditions, and finally sought to modify the existing, or devise a new, lactometer for determining the specific gravity accurately. The fat and total solids in this work were determined by the Babcock asbestos method, while the specific gravity was determined with the Westphal balance at 15° C.

From the work the authors conclude:

"For purposes where exact percentages of total solids are demanded, the use of any formula will not fulfill the requirements.

"Of the formulas in general use, that known as the Babcock (revised) formula gave results closest to those obtained gravimetrically. In 430 composite samples analyzed for total solids 256, or nearly 60 per cent, when calculated with this formula agreed within 0.25 per cent of the figures obtained gravimetrically, and 389, or over 90 per cent, agreed within 0.50 per cent. In another test with 84 samples of milk obtained from four individual cows under official testing conditions, determinations made on each milking showed that the total solids calculated by the formula in 53 cases, or 63 per cent of the total, agreed within 0.25 per cent of the gravimetrically determined figures; and in 78 cases, or 93 per cent of the total, they agreed within 0.50 per cent.

"Neither individuality nor breed in the cows seemed to exert any notable influence upon the application of the formulas.

"The Babcock formula may be safely used with normal milk where only comparatively close approximations are required. It must be left to the decision of those in need of such figures as to whether or not the formula will fulfill their particular requirement.

"The lactometers in common use for determining specific gravity of milk are not sufficiently sensitive to be used in connection with the Babcock fat test for estimating total solids in milk by formula. A modification of the Quevenne lactometer was, however, devised which was found to yield results quite as accurate as those obtained with the Westphal balance and at the same time so constructed that it may be used successfully by those unskilled in the use of chemical apparatus."

The degree of accuracy with which proteins can be estimated in milk by aldehyde titration, H. D. Richmond (*Analyst, 36 (1911), No. 418, pp. 9–12*).—The aldehyde figure of milk (E. S. R., 22, p. 309) was found to agree well with the results obtained by the Kjeldahl method when using the factor 6.38 for the latter. The maximum errors of a single determination were +0.2 and —0.13. An abnormal milk containing much albumin had a limit of error of 0.5 per cent.

The polarimetric estimation of milk sugar, H. D. Richmond (*Analyst, 35 (1910), No. 417, pp. 516, 517*).—Acid mercuric nitrate, according to the author, does not in every case precipitate all the proteins from milk or from a solution of milk products. He, therefore, utilizes a double precipitation method, which "is to prepare the solution for the polarization of milk sugar with acid mercuric nitrate as usual, and to add to this 5 per cent of phosphotungstic acid and 5 per cent of 1:1 sulphuric acid. After filtration, the solution is polarized and the reading multiplied by 1.1."

The results obtained by the new method were very much higher.

A rapid process for the estimation of coconut oil in admixture with butter fat, N. C. Cassal and B. H. Gerrans (*Chem. News, 102 (1910), No. 2655, pp. 190, 191*).—The author describes a method with which it is possible to increase markedly the difference between the titration figures for the insoluble fatty acids from coconut oil and those for the insoluble fatty acids from butter. The process is simple and requires only about 2½ hours.

A method for coloring the fat precipitated in the Gerber acidobutyrometric method, H. M. Hoyberg (*Ztschr. Fleisch u. Milchhyg., 21 (1910), No. 2, pp. 46, 47*).—In order to determine whether the fat has been completely precipitated, the author recommends coloring it with Sudan III, by adding it to the amyl alcohol in the form of a 2 per cent alcoholic solution.

Interpretation of the analytical results for milk adulterations, A. Fabinès (*Indus. Lait. [Paris], 36 (1911), No. 2, pp. 17–24*).—After discussing the various factors which influence the composition of milk, the author describes the mathematical and other methods for detecting the addition of water, the removal of cream, and the simultaneous removal of cream and addition of water.

The influence of potassium bichromate on the results of milk analyses, L. Garnier (*Jour. Pharm. et Chim., 7. ser., 3 (1911), No. 2, pp. 55–59*).—The author determined the effect of adding bichromate to milk (1:1,000) upon the ultimate results obtained on analysis. It seems that the addition of this substance increases the acidity, refraction, and cryoscopic constants, but diminishes the lactose content.

The volatile oils, E. Gildemeister and F. Hoffmann (*Die Ätherischen Öle. Leipsic, 1910, vol. 1, 2. ed., pp. VIII+697, pls. 2, figs. 75*).—This is the first volume of the second edition of this well-known work, which was prepared under the direction of Schimmel and Company of Leipsic. The second edition has been edited by Dr. E. Gildemeister.

The menthol content of Hungarian peppermint oil, K. Irk (*Kisérlet. Közlem., 13 (1910), No. 4, pp. 476–491*).—The following results were obtained: Ester content from 6.93 to 16.26 per cent, menthol ester 5.46 to 12.82 per cent, free menthol 42.815 to 59.90 per cent, total menthol 55.19 to 55.38 per cent, and menthon 7.38 to 13.21 per cent. The results are compared with peppermint oils from various countries.

Determining oil of sesame in arachis oils, H. KREIS (*Mitt. Lebensm. Untersuch. u. Hyg., Schweiz. Gsndhtsamt., 1 (1910), No. 5, pp. 293, 294; abs. in Chem. Ztg., 34 (1910), No. 117, p. 1040*).—The author lays particular stress upon the value of estimating the sesamin content of arachis oils. As the result of examining microscopically 20 such oils, which contained quantities varying from 1 to 5 per cent of pure arachis oils, using 150 cc. of oil at one time and with the aid of Bömer's reaction (acetic anhydrid and concentrated sulphuric acid), he was able to establish a fairly good quantitative method for sesame oil in these oils.

[Palm oil; its utilization as an edible fat], E. FICKENDEY (*Tropenpflanzer, 14 (1910), No. 11, pp. 566–570; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 22, p. 1319*).—As the production of palm oil is now commercially feasible, the author points out the following criteria which must be taken into consideration in producing a good product. They are (1) the use of absolutely ripe and fresh fruit, (2) the necessity of destroying the lipolytic enzym, and (3) the rapid treatment of the fruit to avoid undue contamination with microorganisms.

Purification of insoluble fatty acids, E. B. HOLLAND (*Abs. in Science, n. ser., 33 (1911), No. 844, pp. 344, 345*).—"As the author found it impossible to purchase insoluble fatty acids of a satisfactory quality," it became necessary to undertake a study of various methods for their purification. The methods that seemed the best adapted for the purpose were (a) distillation of the fatty acids in vacuo, (b) crystallization from alcohol, and (c) distillation of the ethyl esters in vacuo, and all were given extended trial.

"It was found that while saturated fatty acids may be purified by distillation of either the acids or their ethyl esters, the latter method is less hazardous and much easier to manipulate, although more steps are required. Crystallization is a finishing rather than an initial process of purification."

Detection of albumin in animal urine with tablet reagents, P. E. BEYER (*Über den Nachweis von Eiweiss im Tierharn mit Merck's Tabletten. Inaug. Diss., Univ. Bern, 1909, pp. 39, tables 4*).—The author tested Merck's tablet reagents (Esbach's test, picric and citric acids, Riegler's β-naphthalene sulphonic acid, and Merck's "A and B," which consists of (A) citric acid and (B) potassium ferricyanid) in regard to their relative value for detecting albumin in human, dog, horse, and bovine urines, and concludes that Riegler's test furnishes the most accurate and constant results. He also tested the value of Merck's Esbach tablets for detecting creatinin in urine, and found that these served the purpose very well.

A bibliography of 75 titles is appended.

On the estimation of urea, A. E. TAYLOR (*Jour. Biol. Chem., 9 (1911), No. 1, pp. 25–28*).—A discussion in regard to the comparative value of the Folin (E. S. R., 17, p. 165) and Benedict (E. S. R., 20, p. 1105) methods for estimating urea in urine.

Identification of methyl alcohol in ethyl alcohol, H. ENGELHARDT and H. W. JONES (*Merck's Rpt., 20 (1911), No. 1, pp. 10–12*).—The experiments were confined principally to those methods in which the oxidation is carried out in an acid medium with potassium permanganate, potassium bichromate, or ammonium persulphate. The results show that Hinkel's method[a] is the most satisfactory, and that with it less than 0.5 per cent of methyl alcohol in ethyl alcohol can be detected.

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[a] Analyst, 33 (1908), No. 392, pp. 417–419.

Analyses of mixed paints, E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Paint Bul. 5, pp. 57–71*).—This is a statement of the composition of commercial paints of various brands, which in some instances were obtained on the open market, and in others direct from the manufacturer. Analyses of the pigment and the vehicle are given, and the results are discussed.

Manufacture of cereal vinegars, W. HOFFMANN (*Deut. Essigindus., 14 (1910), Nos. 50, pp. 369, 370; 51, pp. 377, 378*).—A description of the processes involved in the manufacture of cereal vinegars, with particular reference to malt vinegar.

Alcohol formation during sauerkraut fermentation, C. WEHMER (*Centbl. Bakt.* [*etc.*], *2. Abt., Ref., 28 (1910), No. 4–5, pp. 97, 98; abs. in Chem. Ztg., 34 (1910), No. 142, p. 585*).—It is observed that during the fermentation of cabbage a certain amount of alcohol is produced with the lactic acid.

Potato alcohol in Russia, J. H. GROUT (*Daily Cons. and Trade Rpts.* [*U. S.*], *14 (1911), No. 22, p. 348*).—A report in regard to the progress made in the production of potato alcohol in Russia.

Information for distillers and yeast manufacturers, R. KUSSEROW (*Pure Products, 6 (1910), No. 11, pp. 649–652*).—This article deals with the importance of the proper solution of the nitrogenous substances in mashing and its influence on fermentation, and further, the effect of the addition of sugar to a fermented wort.

Preparation of caramel, J. J. HAZEWINKEL (*Meded. Proefstat. Java-Suikerindus., 1910, No. 40, pp. 497–524*).—Tests in regard to the preparation of caramel from sugar (molasses, etc.) with the aid of lime are reported and discussed.

The report of the agricultural experiment station of the Duchy of Baden at Augustenberg, 1909, F. MACH (*Ber. Grossh. Bad. Landw. Vers. Anst. Augustenb., 1909, pp. 154*).—This is a report of the station activities for the year 1909. It also contains a history of the station for the last 50 years.

Agricultural-chemical laboratories in Germany, Holland, and Belgium, I. LUGNER (*Meddel. K. Landtbr. Styr.* [*Sweden*], *1910, No. 5 (152), pp. 29, figs. 3*).—A brief description of the above-named laboratories, with notes in regard to some of the investigations being conducted in them at the present time.

METEOROLOGY—WATER.

Meteorological observations, F. A. STOCKDALE (*Rpt. Bot. Gard. Brit. Guiana, 1909–10, pp. 18–25*).—Observations on pressure, temperature, and rainfall at the Botanic Gardens, Georgetown, and at various other places in British Guiana during 1909 and a number of previous years, are recorded and briefly discussed.

A new sand evaporimeter, A. DEMOLON and G. BROUET (*Sta. Agron. Aisne Bul., 1910, pp. 66–72, fig. 1*).—The sand evaporimeter used consisted essentially of a metal cylinder 114 mm. in diameter holding about 3 kg. of sand, which was inclosed in a somewhat larger cylinder containing the water supply and provided with a graduated gauge for measuring the rate of evaporation.

Observations with this evaporimeter in comparison with a Piche evaporimeter during 7 months are recorded. These show a uniformly higher rate of evaporation from the sand than from a water surface in the Piche evaporimeter. The rate of evaporation was reduced by rainfall and increased by east winds. The evaporation as measured both by the Piche and sand evaporimeters was decidedly greater than the rainfall during the warmer months of the year.

On the dissolved matter contained in rain water collected at Lincoln, New Zealand, G. GRAY (*Separate from Canterbury Agr. Col. Mag., 24 (1910), Nov., pp. 12*).—This article reports the results of investigations on this subject during the two years ended June 30, 1909, the investigations being similar to those made by the author in the years 1884 to 1888.

"The average results obtained during the years 1907–1909 show that the rainfall at Lincoln brings annually to the soil 142.21 lbs. of dissolved matter. Chlorin in the form of common salt is the most abundant constituent, amounting to 34.8 lbs. per acre, equal to a dressing of 57 lbs. of common salt; this amount is sufficient for most ordinary crops. Sulphuric acid, mainly in the form of sodic sulphate, is received to the extent of nearly 19 lbs. per acre. This amount is sufficient for ordinary crops, except perhaps root crops. The nitrogen received as ammonia salts amounts to 0.740 lb. per acre, and that as nitrate to 0.808 lb. per acre. The total nitrogen would be equivalent to a dressing of 9.4 lbs. of nitrate of soda per acre."

Snow limits and climate, V. PASCHINGER (*Mitt. Justus Perthes' Geogr. Anst., 57 (1911), Feb., pp. 57–60, pl. 1*).—The variation in depth and distribution of snow in its relation to climate in the northern hemisphere is briefly discussed in this article.

The cycle of water (*Rev. Écon. Internat., 7 (1910), II, No. 1, pp. 7–95*).—This is a symposium consisting of papers on Filtration Through Sand, by A. Kemna; Sterilization on a Large Scale, by E. Imbeaux; Decantation and Filtration of River Water, by A. C. Houston; and Biological Treatment of Town and Country Sewage, by A. Calmette, which deals quite fully with methods of securing an adequate and safe water supply in town and country and of disposing of sewage. Sewage farming is not considered in itself an adequate means of disposing of large quantities of sewage.

Indispensable conditions for good hygiene of wells, LOMRY (*Tech. Sanit., 5 (1910), pp. 158–162; abs. in Wasser u. Abwasser, 3 (1911), No. 12, p. 492*).—The precautions which must be observed in order to protect wells from contamination with disease germs are briefly set forth.

Mercury vapor lamps and action of ultra-violet rays, F. M. PERKIN (*Trans. Faraday Soc., 6 (1911), No. 2–3, pp. 199–204, pl. 1, figs. 2*).—This article discusses briefly the theoretical principles and practical methods of applying the mercury vapor lamp in the sterilization of water. Its application in the sterilization of other substances, such as milk and butter, is also suggested.

SOILS—FERTILIZERS.

[Papers on soils and soil investigations] (*Verhandl. Internat. Agrogeol. Konf. [Stockholm], 2 (1910), pp. 117–124; 149–159; 276–278; 234–289; 290–296, 329, 330*).—These papers were read at the Second International Agrogeological Congress at Stockholm (E. S. R., 24, pp. 218, 298).

The principles of the circulation of water in cultivated soils and their application, R. d'Andrimont (pp. 117–124).—This is a general discussion of the forms and movements of soil water, especially as related to plant growth.

The movement of nitrates in clay soils, S. Johansson (pp. 149–159).—The author reports and discusses the results of determinations of nitrates, at different dates and depths, in a heavy soil deficient in humus and nitrogen which had received an application of barnyard manure, and also in the drainage water from the soil.

The results bring out clearly the close relation between the amount and movement of the soil water and the distribution of nitrates in the soil. Knowing the water capacity of a soil, it is easy to estimate the depth to which a given rainfall will descend, carrying with it nitrates, and when the evaporation from the surface will cause an upward flow of the water with a consequent rise of the nitrates in the soil.

The types of soils and their importance, S. de Miklaszewski (pp. 276–278).—The author emphasizes the fact that the soil type is determined by the predominant factor concerned in its formation. Since this varies with each type, it requires that special methods of investigation be used with each soil examined.

The classification of mineral soils according to external characteristics, A. Atterberg (pp. 284–289).—In this paper the author reports results of studies on firmness and plasticity of soils.

To determine firmness the soil was made into 2-cm. cubes, dried at 100° C., and the weight required to split the cubes with a steel spatula noted. On this basis the following classification is proposed: Firmness of 60 to 31 kg., clay; 30 to 16, strong loam; 15 to 8, loose loam; 7 to 0, sand.

As only clay soils are plastic, it is proposed that plasticity be taken as the dividing line between clay and loam soils. Simple methods of determining the degree of plasticity are described, the plasticity being stated in terms of the water content of the soil used in the plasticity test. On the basis of such tests the author divides soils into highly plastic clays, medium plastic clays, and slightly plastic clays.

A tentative division of loam soils into firm and loose loams is given, the firm loams being called clay loams. The sandy soils are divided into coarse sands, fine sands, and silt soils.

The firmness of clay soils is attributed to the extreme fineness of the soil particles. The plasticity, on the other hand, is attributed not only to fineness of particles but to their form as well.

Concerning agrogeological mapping, K. O. Björlykke (pp. 290–296).—This paper discusses the distinctions between geological and agrogeological soil mapping as well as the present status of such work.

The author holds that a soil survey of a region should contain a geographic and orographic exposition; a discussion of climatic relationships and of the agricultural and other industries of the region; geological observations on the soil-forming rocks and the soil surface; a description of the different soil types, their physical and chemical characteristics, and their relation to cultivated plants and to general vegetation; and a discussion of the future agricultural possibilities of the region. The agrogeological maps should be of two kinds, (1) reconnaissance maps and (2) detail maps. The first should include district maps and farm maps.

Red soils (terra rossa), G. Murgoci (pp. 329, 330).—The author here reports limited observations on red soils in Asia Minor. It is believed that these soils are of the same origin as the red soils of southern Europe.

The volumetric constitution of soils (*Rev. Sci.* [*Paris*], *49* (*1911*), *I, No. 5, p. 150*).—This article calls attention to the volumetric variation of soils containing like proportions of plant nutrients, and emphasizes the importance of some method of expressing the results of chemical analysis on the basis of volume as well as of weight.

Tanks for soil investigations at the Florida Agricultural Experiment Station, A. W. Blair and S. E. Collison (*Jour. Indus. and Engin. Chem.*, *3* (*1911*), *No. 1, pp. 32, 33, figs. 3; abs. in Jour. Soc. Chem. Indus.*, *30* (*1911*), *No. 3, p. 144, fig. 1*).—This article describes a series of soil tanks used to supplement the field work in orange culture, to estimate accurately the loss of soluble fertilizing materials in the drainage waters, and to investigate the effects of long-continued use of commercial fertilizers on the soil and on the orange tree.

Each tank has an inside diameter of 5 ft. 3¼ in. with a maximum depth of 4½ ft., and a surface area of one-thousandth of an acre. The tanks are constructed of heavy galvanized iron, soldered, riveted, and painted inside and out. The bottom slopes to a point near one side, where a strainer opens into a 2-in. tin-lined drainage pipe a little over 4 ft. long. In each of four corners of a central collecting pit there is placed a receptacle into which the drainage waters of the tanks are discharged. Connected with these receiving tanks is an overflow tank, to be used in case of emergency, as from long-continued heavy rains. The collecting pit, which is about 8 ft. deep and 6 ft. square, is built of brick with a concrete bottom, and is covered.

The tanks were sunk into the ground to within a few inches of the top and filled with soil to within 3 in. of the edge. The sloping part of the bottom was covered with a layer of smooth quartz pebbles, the coarsest material being placed around the drainage opening. The soil dug from the site which each tank was to occupy was divided into four lots, the top 9 in. forming the first lot, followed by 3 one-foot sections. In filling the tanks the last foot taken from the ground was placed on the gravel in the bottom of the tank, then the next foot was taken, and so on to the top 9 in. The soil was well tamped, each tank containing 8,625 lbs. of dry soil. One orange tree was planted in each tank.

On the influence of shade on the evaporation of water from the soil, C. von Seelhorst (*Jour. Landw., 58 (1910), No. 3, pp. 221–228*).—Results of observations comparing the evaporation from a loam soil shaded with dry rye plants, and the same type of soil unshaded, show that the shaded soil evaporated 13.9 per cent less of the rainfall than the unshaded soil.

The value of pyritic moor soils as a foundation for drainage structures, G. Fendler and L. Frank (*Gsndhts. Ingen., 33 (1910), No. 49, pp. 877, 878*).—In view of the fact that injuy to drainage structures at Osnabrück had been attributed to the presence of free sulphuric acid in water derived from a moor containing pyrites and the belief that such conditions are more or less general, the author made a series of examinations of samples of water from a moor of this character. He failed to find free sulphuric acid present, the analyses showing the presence of a sufficient amount of carbonates to exclude the possibility of formation of free sulphuric acid.

On the plasticity of clay soils, J. M. Van Bemmelen (*Chem. Weekbl., 7 (1910), No. 37, pp. 793–805*).—This article summarizes present knowledge regarding the absorption of water by clay, the swelling and shrinking of clay, the formation of colloids in clay by the action of acids and alkalis, the structure of clay, and chemical action in clay soils of varying structure, and discusses various theories of plasticity.

Soil organic matter as material for biochemical investigation, O. Schreiner and E. C. Shorey (*Jour. Franklin Inst., 171 (1911), No. 3, pp. 295–300; abs. in Science, n. ser., 33 (1911), No. 844, pp. 339, 340*).—This article emphasizes the importance of an exact knowledge of the composition of the organic matter of the soil and describes in outline the methods pursued by the Bureau of Soils of this Department in separating the organic compounds of the soil. See also a previous note (E. S. R., 24, p. 301).

Cholesterol bodies in soils: Phytosterol, O. Schreiner and E. C. Shorey (*Jour. Biol. Chem., 9 (1911), No. 1, pp. 9–11, pl. 1*).—This work has been previously noted (E. S. R., 24, p. 301), but is here discussed in a more extended manner.

Oxidation in soil, M. X. Sullivan and F. R. Reid (*Jour. Indus. and Engin. Chem., 3 (1911), No. 1 pp. 25–30; Chem. News, 103 (1911), Nos. 2673, pp. 73–75; 2674, pp. 88, 89*).—The authors describe a method of testing oxidation in soils by means of changes produced in easily oxidizable substances, such as aloin, when brought in contact with the soil, and report investigations on the effects of various factors and treatments on soil oxidation. It is believed that the study of oxidation in soil has considerable value in relation to soil fertility, since certain factors which favor productiveness favor oxidation. The following conclusions are drawn:

"Soils have the power to oxidize aloin. This oxidizing power is increased by adding water to optimum moisture, by the commonly used fertilizers in conjunction with plant growth, by salts and manganese, iron, aluminum, calcium, and magnesium, in the presence of simple organic hydroxyacids.

"Oxidation in soil is comparable to oxidation in plants and animals. The oxidative power of the soil appears to be mainly nonenzymotic, the results of interaction between inorganic constituents and certain types of organic matter. It may be brought about by organic matter in a state of autoxidation and by inorganic oxygen carriers such as manganese and iron.

"Oxidation is greater in the soil than in the subsoil. Oxidation is greater in fertile soils than in infertile soils." (See also E. S. R., 24, p. 223.)

Soils of the eastern United States and their use, I.—The Norfolk fine sandy loam, J. A. BONSTEEL (*U. S. Dept. Agr., Bur. Soils Circ. 22, pp. 16*).—This is the first of a series of circulars, and deals with the geographic distribution, characteristics of soil and subsoil, surface features and drainage, extent of occupation, limitations of uses, tillage requirements, and crop adaptations of the Norfolk fine sandy loam, of which a total area of 4,346,672 acres in 63 different areas in 9 States has been surveyed by the Bureau of Soils

Soils of the eastern United States and their use, II.—The Norfolk fine sand, J. A. BONSTEEL (*U. S. Dept. Agr., Bur. Soils Circ. 23, pp. 16*).—This is the second of a series of circulars noted above, and deals with the Norfolk fine sand, of which a total area of 1,595,072 acres in 46 different areas in 11 States has been surveyed by the Bureau of Soils.

[County geological surveys in Iowa], M. F. AREY, T. H. MACBRIDE, S. W. STOOKEY, and B. SHIMEK (*Iowa Geol. Survey Ann. Rpt., 20 (1909), pp. 1–542, pls. 42, figs. 42, maps 10*).—Geological surveys of Butler, Grundy, Hamilton, Wright, Iowa, Wayne, Poweshiek, Harrison, Monona, and Davis counties are reported. These reports deal not only with the physiography, stratigraphy, and economic products, but also contain important sections relating to soils.

Soil observations in Istria: Red soils (terra rossa), WILHELM GRAF ZU LEININGEN (*Naturw. Ztschr. Forst u. Landw., 9 (1911), No. 2, pp. 65–89, figs. 2*).—This article reports observations on the influence of weathering and soil formation on vegetation in Istria, and on the extent, formation, and origin, and the physical and chemical properties, of the red soils (terra rossa) of that region. It is stated that these soils are derived principally from the residue of limestone rocks, and to a less extent of flysch (sandstone). In the process of formation the calcium and magnesium are washed away, leaving the aluminum and iron compounds to form the red soil.

Typical red soils are fine-grained, impervious, and retentive of moisture. Mechanical analyses are reported which showed from 66 to 81.4 per cent of clay. Chemical analysis of a typical sample showed water and organic matter 11.77, silica 47.79, ferric oxid 32.24, alumina 3.15, manganic oxid 1.35, lime 0.68, magnesia 1.37, potash 1.15, soda 1.56, and phosphoric acid 0.24 per cent. As the analysis shows, these soils are deficient in lime. They are therefore benefited both chemically and physically by liming.

Some results of a flying soil survey, B. C. ASTON (*Jour. New Zeal. Dept. Agr., 2 (1911), No. 1, pp. 10–17, figs. 6*).—This article summarizes the more important results presented in a former report on the soils of the subantarctic islands of New Zealand (E. S. R., 24, p. 19), calling attention to the unusually high nitrogen content of the soils and to the fact that the quality of the soils is closely correlated with the character of the vegetation, each soil type corresponding to a characteristic flora.

Influence of the soil on the composition of some plants, J. M. M. DORMAAR (*Meded. Proefstat. Java-Suikerindus., 1909, No. 23, pp. 585–599; abs. in Chem. Zentbl., 1909, II, No. 8, p. 649; Chem. Abs., 5 (1911), No. 6, pp. 1147*).—Various plants were grown on volcanic ash and clay soil, and the total nitrogen, albuminoid nitrogen, moisture, crude fiber, ash, and ash constituents were determined in the mature plants. The plants made better growth on clay than on the volcanic ash, and contained more phosphates, sulphates, chlorids, and potash, but less lime.

Investigations on the value of root residues of various plants as nitrogen collectors and green manure, E. HOTTER, E. HERRMANN, and J. STUMPF (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 2, pp. 152–174*).—Investigations similar to those of Werner and Weiske to determine the fertilizing effect of the roots of alfalfa, red clover, vetch and oats, grasses, corn, winter wheat, and oats, as compared with fertilizers containing nitrate of soda, are reported. The weights and composition with reference to fertilizer constituents of the above-ground and underground portions of various crops of these plants are given, as well as the yields of winter wheat and oats following the turning under of the roots of the leguminous plants or applications of fertilizers containing nitrate of soda.

The results show in general that the turning under of the roots of the leguminous plants produced as large an increase in yield the first year as the application of normal amounts of nitrate of soda, and that the beneficial effect was appreciable during two succeeding years, whereas there was no effect of the nitrate of soda after the first year.

The analyses showed that the root residues of the alfalfa supplied about 267.76 lbs. of nitrogen per acre during four years, of the red clover 151.73 lbs. per acre during 2 years, and of the vetch and oats 89.25 lbs. during 1 year, more than enough to supply the needs of maximum crops of cereals.

The authors conclude that by following a rotation in which from one-fifth to one-sixth of the total area is kept in leguminous plants, the stubble of which is turned under, the total amount of nitrogen required in grain farming can be supplied, without resort to the use of nitrate of soda. At the same time the above-ground portion of the leguminous crops can be fed to stock, the manure from which will furnish an additional supply of nitrogen.

On the penetration of fertilizers into the soil, A. DEMOLON and G. BROUET (*Sta. Agron. Aisne Bul., 1910, pp. 73–85, figs. 2*).—Observations on the rate of diffusion and depth of penetration of sodium chlorid in sand and clay, and of sodium nitrate in garden soil, showed that even in sand the rate of diffusion of sodium chlorid is very low, while the clay showed very strong absorbent power for the chlorid. The rate of diffusion of nitrate of soda in loam soils was much less than is generally assumed. There is apparently little danger of loss of nitrates in strong soils during the period of plant growth. In view of the slow rate of diffusion shown by these investigations the author strongly urges the necessity of thoroughly mixing even the more soluble fertilizers with the soil to a considerable depth.

The use of nitrate of soda in commercial fertilizers, C. S. CATHCART (*Jour. Indus. and Engin. Chem., 3 (1911), No. 1, pp. 30–32*).—In view of the fact that fertilizer manufacturers give as the principal reasons for the comparatively limited use of nitrate of soda in mixed fertilizers (1) the loss of nitrogen in mixtures containing the nitrate, and (2) the unfavorable mechanical condition of such mixtures, the author made a series of experiments which showed that the loss of nitrogen from mixtures containing nitrate is not of great importance if the materials are kept dry, but that there is an appreciable loss when the mixtures absorb moisture. The experiments also showed that fertilizer mixtures containing as much as 2.5 per cent of nitrogen and 10 per cent of potash may be stored under severe weather conditions without serious deterioration in mechanical condition provided sulphate of potash is used. Mixtures containing muriate of potash deteriorate in mechanical condition after having been stored for a short time.

A study of the composition, toxicity, and chemical and biological evolution of crude ammonia, A. Demolon and G. Brouet (*Sta. Agron. Aisne Bul., 1910, pp. 92–118*).—Crude ammonia, a by-product of gas manufacture, is stated to be a complex mixture of various forms of nitrogen, the most important being ferrocyanids. Sulphocyanids are sometimes present in small amounts. Sulphur, much of it in free state, is always an important constituent of the material.

The crude ammonia is practically unaffected by such natural physical agencies as moisture, oxygen of the air, etc. It varies in toxic properties largely in proportion to the amount of sulphocyanids present. The toxicity disappears slowly in moist air, but more rapidly in contact with the soil. The ammoniacal nitrogen in the crude ammonia is readily assimilated by micro-organisms. The sulphocyanids are more slowly disposed of in this way, while the ferrocyanids are still more resistant.

Preliminary report on the peat deposits of Florida, R. M. Harper (*Fla. Geol. Survey Ann. Rpt., 3 (1910), pp. 197–366, pls. 13, figs. 14*).—This report deals with the conditions of formation, distribution, classification, composition, and utilization of the peat deposits of Florida. The use of these peat deposits for fertilizer and fertilizer filler and as agricultural soils is referred to. A bibliography of the subject is given.

Potash salts of Galicia, F. J. Machalske (*Amer. Fert., 34 (1911), No. 6, pp. 17–23*).—The potash deposits of Galicia are described and compared with those of Germany. It is shown that large and rich deposits of potash salts occur in the eastern part of Galicia, especially in the vicinity of Kalusz, and that conditions are now favorable for their exploitation.

A preliminary paper on the Florida phosphate deposits, E. H. Sellards (*Fla. Geol. Survey Ann. Rpt., 3 (1910), pp. 17–41, pls. 5*).—The hard rock and land pebble phosphate deposits are described and statistics of the Florida phosphate industry for 1909 are given.

Phosphate deposits [of Egypt] (*Bd. Trade Jour. [London], 72 (1911), No. 746, pp. 573, 574*).—Brief accounts are given of deposits in the Nile Valley, the Red Sea hills, and the Dakhla Oasis. These phosphates are as a rule of low grade but may become commercially important.

Constitution of Thomas slag, H. Blome (*Metallurgie, 7 (1910), pp. 659–667, 698–705; Stahl u. Eisen, 30 (1910), p. 2161; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 24, p. 1467; Chem. Ztg., 35 (1911), No. 21, Repert., p. 78*).—The author investigated the cause of the increase in citrate solubility resulting from the fusion of Thomas slag with sand. He succeeded in producing a fusion of tetracalcium phosphate and calcium orthosilicate which was practically completely soluble in 2 per cent citric acid. His investigations indicate that this increase in solubility is due to the formation of the double compound shown by Stead and Ridsdale to have the composition of $4CaO, P_2O_5+SiO_2$ with a melting point of 1,700° C.

On the action of an addition of alumina and silicic-acid gels to the soil on the assimilation of phosphoric acid by plants, T. Pfeiffer and E. Blanck (*Mitt. Landw. Inst. Breslau, 6 (1911), No. 2, pp. 315–324*).—Experiments are here reported in which pots containing 17 kg. of pure sand received a basic fertilizer of 3 gm. of potassium phosphate and 50 cc. of water extract from a sandy lupine soil, alumina and silica being added at rates of 885 and 284 gm., respectively. Yellow lupines were grown in the pots.

The results show that the alumina and silicic acid gels reduced the yield of dry matter and the phosphoric acid content of the plant. Freezing and the addition of calcium chlorid had no effect. Heating reduced the yield of dry matter and probably the phosphoric acid assimilation. The results indicated that phosphoric acid did not enter into adsorptive but into chemical combination.

Manganese causing bare patches in soil (*Agr. Gaz. N. S. Wales, 22 (1911), No. 1, p. 70*).—It is stated that superphosphate almost fully corrected the toxic condition of soils in which an excess of manganese (0.24 per cent of Mn_3O_4) had completely killed the grass.

Manganese in field experiments, H. Bartmann (*Jour. Agr. Prat., n. ser., 20 (1910), No. 47, pp. 666, 667*).—The results are given of tests with manganese salts on the yields of turnips, beans, peas, Irish potatoes, corn, and sugar beets. The yields of potatoes and sugar beets were found to be increased by the use of the manganese salts, reaching the optimum when from 176 to 352 pounds per acre was used.

Columbus municipal garbage reduction plant, I. S. Osborn (*Amer. Fert., 34 (1911), No. 6, pp. 44–48, figs. 9*).—The construction and operation of this plant, which can dispose of 160 tons of garbage per day and produces as a final product garbage tankage fertilizer valued at about $10 per ton, are described. The sale of this fertilizer and of the garbage grease obtained more than pays the cost of operation of the plant.

Fertilizer trade, B. F. Chase, F. I. Bright, and J. White (*Daily Cons. and Trade Rpts.* [*U. S.*], *14 (1911), No. 67, pp. 1094, 1095*).—Statistics are given of the fertilizer trade in the United Kingdom, Brazil, and the United States.

It is stated that the value of the fertilizer imports into the United States during the year ended June 30, 1910, was $8,371,883, of the exports $8,700,640. These figures "do not include imports (1) of nitrate of soda from Chile, which amounted to $16,601,328 in the calendar year 1910, about one-third of which was used for fertilizer, (2) of sulphate of ammonia, which amounted to $4,668,820, chiefly from England, nor (3) potash, which amounted to $8,363,623, mainly from Germany, and a very large portion of which was used as fertilizer."

Commercial fertilizers in the South (*Amer. Fert., 34 (1911), No. 6, pp. 26, 27; Manfrs. Rec., 59 (1911), No. 11, p. 47*).—The rapid increase in consumption of fertilizers in the South is noted, and it is stated that 3,607,817 tons were consumed in 12 southern States during 1910.

Licensed commercial fertilizers, 1911, F. W. Woll (*Wisconsin Sta. Circ. Inform. 24, pp. 11, 12*).—A list of manufacturers and brands licensed for the year 1911.

AGRICULTURAL BOTANY.

Action of nitrogen-fixing bacteria in the earth, A. V. Krainskii (*Dnevn. XII. S"ězda Russ. Est.-Isp. i Vrach.* [*Moscow*], *1910, No. 10, p. 652; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 17–18, pp. 817, 818; Chem. Abs., 5 (1911), No. 3, p. 556*).—In experiments with different soils the author found that the fixation of free nitrogen occurs in the soil by means of micro-organisms. The greatest amount of fixation occurred in damp, but not wet, well aerated, sandy soils where for one part of nitrogen assimilated, 90 parts of carbon were used by the bacteria In sand cultures with *Azotobacter chroococcum*, it was found that 10 mg. of nitrogen were fixed per gram of mannite consumed.

Inoculation experiments on different legumes with Azotogen, nitragin, and infected soil, H. VON FEILITZEN (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *29* (*1911*), *No. 6–8, pp. 198–205, pls. 7, figs. 2*).—The results are given of experiments with soy beans, yellow and blue lupines, serradella, and hybrid clover grown in new moor soils, in which Azotogen (a new trade preparation of legume tubercle bacteria), nitragin, and soil previously grown to the same legume (soy bean excepted), were used as inoculating materials.

The soil infections showed the usual beneficial results, except in the case of the soy bean plant, where no tubercles were formed, as the inoculating soil was from garden beans (*Phascolus vulgaris*). The Azotogen cultures gave very favorable results on all the legumes, while the nitragin gave poorer and less certain results than either of the others.

The physiology of catalase and reductase, V. I. PALLADIN (*Dnevn. XII. S''ězda Russ. Est.-Isp. i Vrach* [*Moscow*], *1910, No. 3, p. 17; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 1, p. 127*).—The author states that in the autolysis of zymogen and seedlings of wheat in water the amount of catalase gradually decreases.

In the presence of disodium phosphate the amount of catalase increases. Monopotassium phosphate decreases the amount of catalase while dipotassium phosphate destroys it. The different phosphates act similarly on reductase. Since the different phosphates act in a similar way on the alcoholic ferments, catalase and reductase may be considered as anaerobic ferments, but the fermentative nature of both are to be given further study.

Observations on the growth and energy of germination of cereals, V. VINER (*Otchet Shatilov. Selsk. Khoz. Opytn. Stantsiĭ, 4* (*1909*), *pt. 2, pp. 90–109; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 2, pp. 263, 264*).—Studies were made on the vitality and viability of seeds, principally of oats, from which it was found that the growth was intimately related to the size and absolute weight of the seeds, while the rapidity of germination was determined by the degree of ripeness and plumpness of the grain.

Concerning the selective permeable membrane of wheat grains, H. SCHROEDER (*Flora, 102* (*1911*), *No. 2, pp. 186–208, figs. 4, dgm. 1*).—The author reports studies made on the permeability of the seed coats of wheat with a number of different solutions, the results confirming in the main those of Brown as to the existence of a selective permeable membrane (E. S. R., 18, p. 727; 21, p. 126).

The rôle of living cells in the ascent of water in plants, P. A. ROSHARDT (*Bot. Centbl., Beihefte, 25* (*1910*), *1. Abt., No. 3, pp. 243–357, figs. 2; abs. in Jour. Roy. Hort. Soc.* [*London*], *36* (*1910*), *No. 2, pp. 474, 475*).—The author carried on experiments with about 800 plants, representing 131 different species, in which he studied the assistance given by the living cells of the stem and petiole in the ascent of sap.

Portions of stems and petioles were killed by means of steam, ether, or xylol. When this was done the distal portions withered after a greater or less interval. The water was found to pass through the dead portion, although in greatly reduced quantity. The withering of the leaves is held to show that some of the living cells were killed. The longer the portion of stem or petiole killed the sooner the withering took place. Plants of the same species, and in the same stage of growth, withered in the same time if the part of the stem or petiole killed was of the same length. Younger portions were found to perish sooner than older ones. In none of the plants was there any trace of injury either to the stem or leaves below the portion killed by steam, ether, or xylol.

The author claims that the living cells of the stem and petiole must give some active help in the ascent of water, but that the amount of help so given varies in different plants.

The relation of transpiration to the water content of leaves in the ocotillo, F. E. LLOYD (*Science, n. ser., 33 (1911), No. 840, p. 191*).—During the summer of 1910 the author made a study of transpiration in the ocotillo (*Fouquieria splendens*).

It was found that the ratio between the intake and outgo of water was not constant, but that during the day the outgo was greater than the intake. The reversed relation obtained during the night. The amount of water relative to the dry weight of the leaves decreased until some time in the early part of the afternoon, after which it was found to increase until about 4 a. m. The decrease of water in the leaf occurred during the period of the opening of the stomata, and these organs were therefore not found closely regulatory of the rate of transpiration.

Light as a formative factor in the habit of growth of Asparagus plumosus, F. C. NEWCOMBE (*Science, n. ser., 33 (1911), No. 840, pp. 190, 191*).—The shoots of this plant are said to grow erect for a time, and then turn their tips to the horizontal position. This bending is geotropic, but it is greatly influenced by the presence of light. Where shoots were so covered as to exclude the light the bending was delayed, and where subterranean buds were covered and caused to grow without ever being in the light the horizontal bend was never complete, but there were nutations through an arc of 20 to 50°.

This behavior is attributed to one of two hypotheses. Either the etiolation disarranges the normal processes, or there is a weak inheritance of diageotropism which needs the supporting influence of light to give the usual form to the plant.

Respiration in air, in nitrogen, and in hydrogen, B. M. DUGGAR and G. R. HILL, Jr. (*Science, n. ser., 33 (1911), No. 842, p. 261*).—A brief account is given of experiments relating to the rate, continuance, and decline of anaerobic respiration or carbon dioxid production in nitrogen and hydrogen as compared with aerobic respiration under otherwise similar conditions. The plant materals used were slices of sugar beet and germinating seed.

Respiration and fermentation, V. I. PALLADIN (*Dnevn. XII. S"ѣzda Russ. Est.-Isp. i Vrach* [*Moscow*], *1910, No. 3, p. 14; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 126, 127*).—The experiments of Stanevich are said to have shown that the treatment of wheat seedlings with different solvents, such as acetone, chloroform, alcohol, etc., affects the process of their setting free carbon dioxid and exerts an influence on the extraction of lipoids. From this the author concludes that one of the stages of alcoholic fermentation consists in the combination of glucose with phosphoric acid, and that lipoids act as conservators of the phosphoric acid required for that process. Lipoids are considered necessary for the anaerobic stage of respiration as well as for alcoholic fermentation.

Prochromogens of the respiratory chromogens of plants, V. I. PALLADIN (*Izv. Imp. Akad. Nauk (Bul. Acad. Imp. Sci. St.-Pétersb.), 6. ser., 1909, No. 5, pp. 371–376; abs. in Zhur. Opytn. Agron (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, pp. 247, 248*).—In previous investigations (E. S. R., 23, p. 230) the author has found that respiratory chromogens increase in leaves of *Rumex patientia* with the addition of saccharose to the culture medium. Similar experiments made with etiolated leaves of *Vicia faba* gave negative results.

On the basis of his experiments the author assumes that the chromogen in the etiolated leaves of the bean is present in a combined state, as can be determined by pouring over wheat seedlings extracts of the etiolated leaves employed in the experiments mentioned above. After 24 hours the wheat seedlings blacken, owing to the fact that they decompose the substances which bind the chromogen in combination and afterwards oxidize it. The action is held to be due to the presence of ferments in the seedlings.

When etiolated leaves of the beans were subjected to autolysis in water the formation of chromogen was noted, this also indicating that it exists in a combined state. It is thought that probably the chromogens appear in combination with the glucosids. This is submitted as a hypothesis, and the author proposes calling the compound "prochromogen."

The photochemical synthesis of carbohydrates in the absence of chlorophyll, J. Stoklasa and W. Zdobnický (*Biochem. Ztschr., 30 (1911), No. 6, pp. 433–456, pl. 1, fig. 1*).—In a previous paper (E. S. R., 24, p. 431) the authors announced the synthetic formation of carbohydrates under the influence of ultraviolet rays and in the absence of chlorophyll. In the present publication a detailed account of their investigations is given.

The authors found in experiments with ultraviolet rays that there was no formaldehyde nor carbohydrates formed from carbon dioxid and water in the absence of potassium hydroxid. From water vapor and carbon dioxid in the presence of potassium hydroxid, formaldehyde was formed but no carbohydrates. Neither formaldehyde nor carbohydrates were produced from carbon dioxid and nonnascent hydrogen in the presence of potassium hydroxid, and in the absence of the ultraviolet rays formic acid was formed from carbon dioxid and nascent hydrogen in the presence of potassium hydroxid. From carbon dioxid and nascent hydrogen in the presence of potassium hydroxid sugar was formed under the influence of the ultraviolet rays.

The authors have shown the synthesis of sugars from potassium bicarbonate and nascent hydrogen, and from their investigations they conclude that pure carbonic acid is not reduced in the presence of nascent hydrogen in the chlorophyll-bearing cell, but that the reduction takes place through the production of potassium bicarbonate formed within the cell. In the presence of this potassium the formaldehyde is condensed into carbohydrates.

Chlorophyll in living chloroplasts, D. I. Ivanovskiĭ (*Dnevn. XII. S"ѣzda Russ. Est.-Isp. i Vrach* [*Moscow*], *1910, No. 7, p. 269; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, p. 126*).—The author notes that the chlorophyll of the living leaf differs from that of an alcoholic or other extract in the position of the absorption bands, in the degree of stability in light and air, and in the dissimilar behavior toward solvents. An investigation is reported on the unequal behavior of the chlorophylls to light and to solvents.

The experiments led to the conclusion that the hypothesis that chlorophyll in living leaves is constantly destroyed and reformed must be modified, as there appears to be no regeneration of chlorophyll in mature leaves. The stability of the chlorophyll of the living leaf in light and air may be accounted for by assuming that in living chloroplasts the chlorophyll is present in the colloidal state. Experiments have shown that chlorophyll in colloidal solution possesses considerable stability in light and air. This assumption will account for the peculiar behavior of chlorophyll of living leaves to solvents.

The author believes that possibly it is in the colloidal chlorophyll that the process of decomposition of carbon dioxid takes place.

The correlation between the osmotic pressure of nutrient solutions and the development and chemical composition of plants, N. K. Mali͡ushchitskiĭ (*Dnevn. XII. S"ѣzda Russ. Est. Isp. i Vrach* [*Moscow*], *1910, No. 9, p. 414; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 122–124*).—During the years 1903 to 1907 cereals were grown in sand cultures with a normal nutrient solution to which were added various compounds of calcium, potassium, sodium, and magnesium, comparisons being made between each individual salt. The solutions were made isotonic, while in another series the strength of the solutions was raised to the same degree of isoconcentration.

The author found that when isotonic solutions were used the plants resembled one another in external appearance, in the amount of dry matter, and in anatomical characters, as well as in the percentage of nitrogen they contained. When, on the other hand, the plants were grown in isoconcentrated solutions, especially in the case of such salts as magnesium sulphate and sodium chlorid, the plants differed not only in their nitrogen content but in other respects.

In 1905 sugar beets were grown in soil cultures in which the osmotic pressure of the soil solutions was raised either by lowering the amount of water in the vessels or by introducing corresponding amounts of sodium chlorid. In both cases the beets had the same sugar content, from which the conclusion is drawn that by making use of the osmotic pressure of the nutrient solutions, other conditions being equal, it is possible to regulate not only the total yield of dry matter, but, within certain degrees, its chemical composition.

In 1907 experiments were made with oats and millet, from which it is concluded that (1) when the amounts of water are equal and the concentrations and the amounts of nutrient substances differ the assimilative activity of the leaves increases with the increase of concentration, (2) when the concentrations are equal the assimilative activity of the leaf increases with the amount of water and the nutrient substances, and (3) when the amount of nutrient salts is equal and the water and concentrations differ the assimilative activity of the leaf diminishes.

The influence of sugar solutions of different degrees of concentration on the respiration, turgescence, and growth of cells, A. MAIGE and G. NICOLAS (*Ann. Sci. Nat. Bot., 9. ser., 12 (1910), No. 2–6, pp. 315–368*).—A study is reported on the effect of different dilutions of saccharose, maltose, lactose, glucose, and levulose on the respiration, turgescence, and growth of bean seedlings. The beans were sprouted and in an etiolated condition were transferred to solutions of the different sugars and the carbon dioxid, oxygen, and respiratory coefficients determined.

The sugar solutions were found to have an osmotic and plasmolytic effect, retarding growth, or to penetrate and diffuse in the cell. The penetrating power was found to vary with the different sugars, and the osmotic action of solutions of equal concentration varied with their penetrating power. All sugar solutions were found to modify respiration after penetrating the cells. The influence of a given sugar on a plant will depend on its penetrating power, its osmotic activity, and its specific action on the chemism of respiration. Sugars of the same group differ little in their specific action, and for equal concentrations their activity is in direct relation to their penetration, saccharose being more active than maltose, and maltose more so than lactose, glucose, and levulose.

The absorption of nutritive substances from the soil by the sunflower in connection with the formation of organic matter, I. KONOVALOV (*Separate from Izv. Kiev. Politekh. Inst., 1909, pp. 143; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 2, pp. 266–268*).—After a review of the literature relating to the absorption of mineral salts and the increase in organic matter in various plants under cultivation, a description is given of experiments with several varieties of sunflowers, in which the dry matter was determined at intervals of from 5 to 8 days from the time of the sprouting of the seed to the ripening of the plant.

In all the varieties the process of increase of organic matter proceeded approximately in like manner. When the flowering heads were being formed, from one-third to one-half of the total organic matter of the plants had been accumulated. With the development of the heads there was a translocation of the plastic material, first from the leaves and then from the stems to the heads. The growth of the vegetative organs was completed before the formation of the flower heads. In the ripe heads the seeds constituted one-half of the dry weight of the head.

It was found that the total nitrogen, the albuminoid nitrogen, and the nitrogen occurring in asparagin and organic bases varied during the different stages of growth, the nitrogen being mostly in the leaves during the first half of the growing period, while in the second half it was found in the flower head. The formation of asparagin took place to a greater extent during the first stages of the formation of the head, when the decomposition of the albuminoid nitrogen was rapidly taking place.

The mineral matter was found most abundant in the leaves, and it was present in greatest quantity during the period of formation and flowering of the heads. In the stems the ash content was the highest during the first half of development, while in the heads it was greatest during flowering.

In comparing the sunflower with other plants it was found that the sunflower needs more nutritive material than cereals or clover, but less organic matter than either.

In regard to the water requirements of the sunflower, these were found to be the greatest from the time of sprouting to the development of the sixth or eighth leaf, after which, by the deep penetration of the root system, the plant can thrive in relatively dry soils.

The assimilation of phosphoric acid by plants, I. POUGET and D. SHUSHAK (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 6, pp. 825–831*).—Experiments are reported on the assimilation of phosphoric acid by wheat seedlings grown in water cultures to which different amounts of potassium phosphate were so added as to make the quantity of phosphoric acid vary from 0.05 to 4 mg. per liter of solution.

For the concentrations varying from 1.1 to 4 mg. the assimilation of phosphoric acid was in direct proportion to the strength of the solution. In concentrations of 1 to 0.137 mg. no direct relation was observed to exist between the taking up of the phosphoric acid and the strength of the solution.

No relation was found to exist between the amount of water evaporated by the plant and the amount of phosphoric acid taken up by it, and under the conditions of the experiment phosphoric acid was taken from the solution more rapidly than the water, the concentration being proportionately reduced, except that where the weaker solutions were employed, as from 0.1 to 0.05 mg., there appeared to be an increase in the amount of phosphoric acid in the solution. This was believed to be due to an exudation from the roots, the phosphoric acid probably existing in the plant in the form of a complex organic compound.

The lime requirements of plants, N. I. KONOVALOV (*Dnevn. XII. S''iezda Russ. Est.-Isp. i Vrach* [*Moscow*], *1910, No. 9, p. 391; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 1, pp. 107, 108*).—The results of the author's investigations indicate that the development of millet, oats, wheat, lupines, etc., is dependent on the amount of calcium present in the nutrient solution. He states that the theory of Loew, while ascribing essential importance to the ratios of calcium to magnesium, does not give sufficient attention to the amounts of these substances required by plants.

The influence of manganese on the development of Aspergillus niger, G. BERTRAND and M. JAVILLIER (*Compt. Rend. Acad. Sci.* [*Paris*], *152 (1911), No. 4, pp. 225–228*).—A preliminary report is given of investigations with

A. niger to determine the effect of increased quantities of manganese on its development.

In the experiments different quantities of manganese sulphate were added to the medium in which the fungus was grown, and the dry weight of the fungus as well as its ash content increased with the increased concentration of manganese up to the pots receiving 1,000 mg. per liter. When the amount exceeded this proportion there was a rapid falling off in the growth of the plant. The amount of manganese fixed, unlike that of some other substances, was not in direct proportion to the quantity contained in the nutrient solution.

The effect on plants of certain substances extracted from coal tar, M. M. Mirande (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 4, pp. 204–206*).—In a previous note (E. S. R., 24, p. 631) the author called attention to the physiological action of vapors arising from tar used on roads as affecting plants.

In the present paper he gives the results of an investigation of the effect on plants of a number of commercial products, such as carbonyle, carbolineum, carbonéine, etc., which are derived by distillation from coal tar. All of these contain creosote in some form, and a number are used as insecticides and for other purposes. The author finds that they are more or less injurious, causing the destruction of the green cells with which they come in contact. On account of their injurious properties he urges great care in their use when applied to living plants.

Intumescences on foliage leaves produced by poisons, Lilly M. Marx (*Österr. Bot. Ztschr.*, *61* (*1911*), *No. 2–3, pp. 49–59, pl. 1, fig. 1*).—The author claims as a result of her investigations that the leaves of *Goldfussia anisophylla*, which had been sprayed with ammonium copper carbonate or a 0.1 per cent alcoholic solution of corrosive sublimate, developed under sufficient warmth and moisture conditions leaf intumescences. If any of these factors (poison, warmth, and moisture) were wanting, no intumescences resulted. The formation of these outgrowths is entirely independent of light or darkness, but the age of the leaf plays a very important rôle, as very young leaves and leaves fully matured did not react to the poisons. Similar results were also obtained with cauliflower and *Conocephalus niveus*.

Some effects of severe freezing upon vegetation in a condition of active growth, F. K. Butters and C. O. Rosendahl (*Science, n. ser., 33* (*1911*) *No. 842, p. 261*).—The authors state that on the night of April 15, 1910, the temperature at Minneapolis fell to 27° F. and a week later to 19° with a high wind. At the time of these frosts vegetation was in an advanced state, and many trees were in full leaf while nearly all others were in active growth.

Observations were made upon about 70 species of woody and herbaceous plants, and it was found that besides the injury due to cold, much mechanical injury resulted from loss of turgidity in succulent young shoots during the early stages of freezing, and from the extreme brittleness of hard frozen leaves and twigs which the wind snapped off in great numbers. The second freeze injured many plants which were not hurt by the first one. About 42 per cent of the woody species lost practically all their foliage, only about 10 per cent being relatively uninjured. Mature leaves and those just unfolding from the bud were less injured than half-grown leaves of the same plant. In about 60 per cent of the species examined the twigs of the new growth were killed or severely injured, and in about 15 per cent the twigs of the previous season's growth, and in a few instances older twigs, were destroyed. Flower buds were somewhat more tender, and open flowers and fruits much more tender, than vegetative parts. The damage to native herbaceous plants was mainly mechanical and relatively slight except in the case of open flowers and developing fruits. A few weeks after the freezes the herbaceous vegetation appeared normal, while the woody plants had just begun to recuperate.

The usual types of recuperation in trees and shrubs were a new crop of leaves when the twigs were uninjured and the terminal bud intact, the appearance of lateral shoots from the leaf axils of uninjured portions when the distal portions of the twigs were destroyed, and by the starting of growth from latent buds upon woody twigs, some of which were several years old. In some cases all these methods of regeneration appeared on the same plant.

Evaporation in its relation to the prairie problem, B. Shimek (*Science, n. ser., 33 (1911), No. 840, p. 192*).—Attention is called to the fact that surfaces exposed to the south and southwest in the Mississippi Valley are usually treeless and that where changes in topography are abrupt the transition from forest to prairie is likewise abrupt. Field operations on the rate of evaporation on treeless and forested areas have been made, and the results of these observations show that evaporation increases with the temperature and the velocity of the wind and that when the temperature is high the fluctuations in evaporation are caused by changes in wind velocity.

The bearing of these results upon prairie formation is discussed.

An isolated prairie grove and its ecological significance, H. A. Gleason (*Science, n. ser., 33 (1911), No. 840, p. 192*).—A description is given of a prairie grove in Champaign County, Ill., about 1 by 3 miles in size, which is located at some distance from a stream. The prevailing trees in the grove are oaks, hickories, and black walnuts, with scattered individuals of other species. The variation in the composition of the forest indicates that it migrated into this region from the northeast. The grove is not continuous, but is broken by areas of low ground which contain permanent standing water.

It is concluded that formerly the whole moraine was covered with forest, but that since the introduction of prairie fires all has been destroyed but this grove, which is protected by standing water. The general conclusion is drawn that forests were formerly of much wider extent in Illinois than at present, but that the prairies do not owe their origin to prairie fires.

Twin hybrids in Œnothera, with a suggestion concerning their explanation, R. R. Gates (*Science, n. ser., 33 (1911), No. 842, p. 262*).—By means of a large number of crosses the type of behavior in Œnothera called by de Vries twin hybrids has been confirmed, and many new crosses which had not previously been reported have been made. The author describes the results of a number of cross pollinations and the forms produced, and gives an account of cultures from wild seeds, which indicate that there is a marked dimorphism of some of the forms in the wild condition. This may account for the occurrence of similar twin types in crosses in which *Œ. biennis* is the female parent, the condition being transmitted in the eggs, but not usually through the pollen.

Cryptomeric inheritance of Onagra, C. S. Gager (*Science, n. ser., 33 (1911), No. 840, p. 191*).—Attention is called to an abnormal plant of *O. biennis* that appeared in a pedigreed culture following exposure to radium rays of the ovule employed in producing the plant.

The plant possessed two primary shoot systems of equivalent value but entirely unlike in morphological characters. The effect was believed to be due to the exposure to the radium rays, although this was not conclusively shown. Hybrids produced between the two unlike halves manifested in the F_1 and F_2 generations the characters of only one of the parent shoots, and this is held to indicate that the inheritance of a character and its expression are quite different phenomena.

Reversible sex mutants in Lychnis dioica, G. H. Shull (*Science, n. ser., 33 (1911), No. 840, p. 192*).—The author describes the discovery in 1908 of hermaphrodite mutants of *L. dioica*, and the obtaining the following year the first generation cross of these with females and normal males. In the present paper data are presented of more than 100 families in which these hermaphrodites were used, most of the families representing the second generation from the originals.

It is shown that the hermaphrodite character is a modified male condition, not due to the presence of an independent modifying character, but obviously to a modified condition of the male-producing gene. This character is not transmitted by the egg, but only by the sperm. Among the offspring of these hermaphrodites there have appeared a few normal males in such proportions that they can only be considered as male mutants, since they also breed true to their male character. The appearance of hermaphrodite mutants in families produced from normal males and the appearance in turn of male mutants in families produced by hermaphrodites suggest reversible modifications of a single gene rather than the addition of one to those previously present, and a subtraction of a gene from them. These results are held to have an important bearing upon the "presence and absence" hypothesis.

FIELD CROPS.

The history of cultivated plants, L. Reinhardt (*Kulturgeschichte der Nutzpflanzen. Munich, 1911, vol. 4, 1. half, pp. 738, pls. 90, figs. 57; 2. half, pp. 756, pls. 76, figs. 35*).—This volume forms part of a work published under the title of Die Erde und die Kultur.

The first part of the volume treats of the cereal grains, fruits, vegetables, oil plants, sugar-producing crops, plants from which condiments are derived, plants furnishing narcotic principles, and the organisms producing fermentation. The second part is devoted to forage, fiber, dye, tannin, rubber, resin, perfume, drug, and ornamental plants, and also treats of the species of trees serving as sources of wood and lumber, the valuable desert plants, and the more important diseases and insect enemies of cultivated crops.

Theory and practice of plant breeding, H. Lang (*Theorie und Praxis der Pflanzenzüchtung. Stuttgart, 1910, pp. VIII+169, figs. 47*).—This book, intended for practical farmers and students, discusses the following topics: The technical equipment of plant breeders, propagation, variability, and inheritance, selection, the breeding of special crops, including wheat, rye, barley, oats, fodder beets, potatoes, maize, red clover, and tobacco, and the protection of the plant breeder against illegitimate competition.

Contribution to the history of wheat, the sugar beet, Jerusalem artichoke, and potato, P. de Vilmorin (*Rev. Gén. Agron., n. ser., 5 (1910), No. 8, pp. 289–305*).—This address contains historical data on certain crops and citations of French writings on the subject.

Wyoming forage plants and their chemical composition, H. G. Knight, F. E. Hepner, and A. Nelson (*Wyoming Sta. Bul. 87, pp. 3–152, figs. 44*).—In continuation of work previously noted (E. S. R., 20, p. 135), tables are given stating the analyses of various grasses, sedges, rushes, and other plants collected at different altitudes (4,100 to 11,000 ft.) in recent years, and miscellaneous analyses of barley, corn, emmer, and native hay.

Analyses are reported for the following plants and descriptions given of many of them: Bearded wheat grass (*Agropyron caninum*), western wheat grass (*A. occidentale*), western couch grass (*A. pseudorepens*), Scribner wheat grass (*A. scribneri*), slender wheat grass (*A. tenerum*), red top (*Agrostis alba*), rough hair grass (*A. hyemalis*), tufted bent grass (*A. humilis*), Colorado sand grass (*Andropogon hallii*), little blue joint (*A. scoparius*), long awned aristida

(*Aristida longiseta*), tall grama grass (*Atheropogon curtipendula*), grama grass (*Bouteloua oligostachya*), slough grass (*Beckmannia erucæformis*), Porter brome grass (*Bromus porteri*), Richardson brome grass (*B. richardsonii*), barren brome grass (*B. sterilis*), buffalo grass (*Buchloe dactyloides*), Canada bent grass (*Calamagrostis canadensis*), purple reed bent (*C. purpurascens*), long leaved reed grass (*Calamovilfa longifolia*), water whorl grass (*Catabrosa aquatica*), green foxtail (*Chætochloa viridis*), tufted hair grass (*Deschampsia cæspitosa*), alkali grass (*Distichlis spicata*), early bunch grass (*Eatonia obtusata*), Canadian wild rye (*Elymus canadensis*), giant rye grass (*E. condensatus*), Indian millet (*Eriocoma cuspidata*), King fescue (*Festuca confinis*), sheep fescue (*F. ovina*), short-leaved fescue (*F. ovina brevifolia*), Wolf false oat (*Graphephorum wolfii*), squirrel-tail grass (*Hordeum jubatum*), little barley (*H. pusillum*), excellent melic grass (*Melica spectabilis*), false buffalo grass (*Munroa squarrosa*), reed meadow grass (*Panicularia americana*), nerved manna grass (*P. nervata*), old witch grass (*Panicum capillare*), switch grass (*P. virgatum*), mountain timothy (*Phleum alpinum*), timothy (*P. pratense*), mountain spear grass (*Poa alpina*), arctic spear grass (*P. arctica*), Buckley spear grass (*B. buckleyana*), mountain blue grass (*P. epilis*), long-stemmed spear grass (*P. longipedunculata*), Patterson spear grass (*P. pattersonii*), nodding blue grass (*P. reflexa*), northern spear grass (*P. nemoralis*), downy oat grass (*Trisetum subspicatum*), Texas crab grass (*Schedonardus paniculatus*), orchard barley (*Sitanion brevifolium*), western cord grass (*Spartina gracilis*), drop seed (*Sporobolus brevifolius*), fine top salt grass (*S. airoides*), sand drop seed (*S. cryptandrus*), Canadian needle grass (*Stipa columbiana*), needle grass (*S. comata*), woolly sedge (*Carex lanuginosa*), Liddon sedge (*C. liddonii, C. acutina*), water sedge (*C. aquatilis*), giant sedge (*C. aristata*), black sedge (*C. atrata*), the beautiful sedge (*C. bella*), mountain sedge (*C. festiva*), Hood sedge (*C. hoodii*), long-beaked sedge (*C. longirostris*), the new sedge (*C. nova*), western sedge (*C. occidentalis*), Raynold sedge (*C. raynoldsii*), the Nebraska sedge (*C. nebraskensis*), hillside sedge (*C. siccata*), alpine or cliff sedge (*C. scopulorum*), bottle sedge (*C. utriculata*), variable sedge (*C. variabilis*), spike rush (*Eleocharis palustris*), small-flowered wood rush (*Luzula parviflora*), spike wood rush (*L. spicata*), great bulrush (*Scirpus lacustris*), small-fruited bulrush (*S. microcarpus*), Merten rush (*Juncus mertensianus*), wire grass or Baltic rush (*J. balticus*), knotted rush (*J. nodosus*), Rocky Mountain rush (*J. saximontanus*), Parry rush (*J. parryi*), alfalfa (*Medicago sativa*), Carolina milk vetch (*Astragalus carolinianus*), matted clover (*Trifolium dasyphyllum*), Parry clover (*T. parryi*), Hooker sandwort (*Arenaria hookeri*), winter fat (*Eurotia lanata*).

In general, the percentage of protein and nitrogen-free extract was found to increase, and that of crude fiber to decrease, with the altitude.

Electroculture, T. Griffet (*Rev. Gén. Chim., 13 (1910), No. 14, pp. 241–245, figs. 3*).—The earlier experiments in electroculture in Europe are briefly reviewed, and the results of recent experiments are reported. Different installations for the purpose of influencing plant growth by means of atmospheric electricity are briefly described. The results seem to indicate that atmospheric electricity is capable of exerting a marked influence in crop production.

Experiments in electroculture, Gerlach and G. Erlwein (*Elektrochem. Ztschr., 17 (1910), Nos. 2, pp. 31–36; 3, pp. 66–68, figs. 6*).—A description in detail is given of the electrical installation used in these experiments, and the results with barley and potatoes are reported. With both crops the increase in yield was insufficient to defray the expense of the electrical treatment.

Electroculture, F. Weis (*Tidsskr. Landökonomi, 1910, No. 2, pp. 136–161*).—A résumé of investigations of the subject to date is given, leading to the conclusion that electroculture is not as yet far enough advanced to be applied in practical agriculture. It is believed to be more promising in horticulture, especially greenhouse culture, with strawberries, cucumbers, tomatoes, etc., where an advance of about 14 days may secure large net returns. Further investigations, however, are considered necessary to determine whether the installation of the necessary apparatus in greenhouses is remunerative.

A bibliography on the subject is presented.

Report on 25 years' work by the agricultural institution at Rotholz, 1879–1904 (*Bericht über die 25 jährige Tätigkeit der Landwirtschaftlichen Landesanstalt Rotholz von ihrer Gründung im Jahre 1879 bis 1904. Innsbruck, 1904, pp. 150, pls. 8, figs. 18, dgms. 5*).—This publication contains a historical review of the institution, outlines the courses given in agriculture, and reports some of the results secured in experimental work, this being based mainly on studies of problems connected with Alpine agriculture.

Report of work with barley, peas, and vetches at Svalöf in 1909, H. TEDIN (*Sveriges Utsädesför. Tidskr., 20 (1910), No. 4, pp. 245–255; abs. in Bot. Centbl., 116 (1911), No. 6, p. 160*).—In a test of 27 2-row barleys 0219 and 0202 Svalöf Gullcorn produced the highest yield. In a test of 12 6-row barleys at Svalöf and Lönnstorp Nordschlesowigst Jätte and Tystofte 27 produced the highest yields.

Alfalfa management in Montana, A. ATKINSON (*Montana Sta. Circ. 5, pp. 72*).—Directions for producing alfalfa and alfalfa seed in Montana.

The time of applying potash salts in buckwheat culture, CLAUSSEN (*Illus. Landw. Ztg., 31 (1911), No. 10, pp. 73, 74, figs. 5*).—The results here reported were secured during 2 years of work.

The use of kainit in the spring reduced the yield by about one-half, while its application in the fall was not injurious but was of indifferent value. It was found that kainit as a fertilizer for buckwheat was of value only when applied to the preceding crop in the rotation.

Corn judging, R. J. NELSON (*Univ. Ark. Col. Agr., Circ. 1, 1909, pp. 3–7*).—This is a circular of information for the members of the boys' corn clubs of Arkansas. A score card for corn and directions for selecting an exhibit of seed corn are followed by notes on the score card and its use.

Corn and cotton, M. NELSON (*Univ. Ark. Col. Agr., Circ. 3, 1910, pp. 8*).—Methods for producing corn and cotton are briefly outlined.

Experiments with cotton, J. F. DUGGAR and E. F. CAUTHEN (*Alabama Col. Sta. Bul. 153, pp. 15–40, pls. 4*).—Among the cotton varieties tested on plats in 1910 Cook, Dillon, Hardin, and Triumph yielded best; "in observation rows, Bate Early Victor, New Triumph, Excelsior Wilt-Resistant, Triumph from Alabama, and Franklin all yielded well." The earlier varieties were Early Mammoth, Broadwell, Bank Account, Trice, Sugar Loaf King, and Shelley, while Hardin, Dillon, Poulnot, and Russell were among the later varieties.

Larger yields followed the use of acid phosphate than were obtained after ground rock phosphate or basic slag. Rowden, Cleveland, Dixie, Simpkins, Dillon, and Poulnot were among the varieties least damaged by anthracnose.

Seed treatment reduced the amount of boll-rot or anthracnose. Immersion of seed in water at 170° F. for 10 minutes was followed by a crop having only 4.9 per cent of the bolls diseased as compared with 11.3 per cent from the untreated seed. The crop secured from seed treated for 22 minutes at a temperature of 150° had 2.4 per cent boll-rot as compared with 9.9 per cent from untreated seed on an adjacent plat. When the seed coat was charred with concentrated sulphuric acid the percentage of diseased bolls was apparently reduced from 11.3 to 5.9. With formalin 4 and 5 per cent, copper sulphate, and carbon bisulphid, the percentages diseased were larger.

At Loachapoka on soil badly infected by wilt or black root, Cook No. 307–6, yielded 8⅜ as much lint as the nearest plat of common cotton; Covington-Toole 3¼ times as much; Cook from Hall about 2⅛ times as much; Excelsior Wilt-Resistant 2⅜ times as much; and a hybrid cotton nearly 2⅛ times as much. When wilted plants were carefully dug and thoroughly burned, and the soil for several feet around saturated with formalin (4 oz. to 1 gal. of water) the disease was not again noted, and this treatment is considered advisable when only a few plants are affected.

Does better cotton seed pay? M. Nelson (*Arkansas Sta. Circ. 8, pp. 4*).—Suggestions on the choice of a cotton variety are accompanied by directions for obtaining better seed.

Fighting the boll weevil, W. E. Hinds (*Alabama Col. Sta. Circ. 6, pp. 7*).—This circular calls the attention of cotton growers to the fact that if the cultural methods as outlined are practiced there will be little difficulty in producing increasingly profitable cotton crops in spite of the boll weevil.

Destroying boll weevils by clean farming, W. E. Hinds (*Alabama Col. Sta. Circ. 7, pp. 8*).—This circular outlines methods for combating the boll weevil and directs attention to the fact that if the stalks are destroyed by October 10 each year as good crops of cotton can be made as in the past and that if other improved practices are adopted, as suggested in this series of circulars, the average yield of cotton in the State can be greatly increased in spite of the presence of the boll weevil.

Flax growing in Montana, A. Atkinson and D. B. Swingle (*Montana Sta. Circ. 6, pp. 9–16*).—This circular gives directions for growing and harvesting flax and for combating the wilt disease.

A comparison of nitrate of soda and ammonium sulphate as fertilizers for oats, H. Svoboda (*Ztschr. Landw. Versuchsw. Österr., 13 (1910), No. 10, pp. 812–828*).—The experiments here reviewed were carried on cooperatively in 1909 and the results are reported in tabular form.

The yields on the check plats, or those receiving no fertilizers, varied from 770 to 3,240 kg. per hectare of grain, the average being 1,653 kg. (1,471 lbs. per acre), and the corresponding yields for straw were from 1,190 to 3,840 kg., with 2,930 kg. as the average for 9 tests. Plats receiving 300 kg. of superphosphate and 100 kg. of potash salts produced a general average of 1,886 kg. per hectare of grain and 3,364 kg. of straw. On plats which in addition to this application received 145.2 kg. of nitrate of soda per acre, there was an increase of 495 kg. of grain and 942 kg. of straw as compared with the unfertilized plats and of 262 kg. of grain and 508 kg. of straw as compared with the plats receiving superphosphate and 40 per cent potash salt. These results from nitrate of soda were better than those secured from the use of 108 kg. of ammonium sulphate per hectare, but the financial results were in two cases in favor of the use of the sulphate.

Winter oats for the South, C. W. Warburton (*U. S. Dept. Agr., Farmers' Bul. 436, pp. 32, figs. 9*).—The author deals with the comparative value for the South of winter and spring oats, winter oat varieties, their soil, fertilizer, and climatic requirements, and use in rotation. Directions are given for the preparation of the seed and seed bed, sowing the seed, later treatment of the land, and harvesting the crop. Other topics discussed are improvement of the crop, insects and diseases, and the use of the grain, straw, and of the growing crop for pasture and other purposes. Tables state the average acreage, yield, and value of the oat crop and the average acreage and value of oats, corn, and wheat in the Southern States for the 10 years from 1900 to 1909.

Potatoes, T. S. Parsons (*Wyoming Sta. Bul. 86, pp. 20, figs. 5*).—In a test of varieties of potatoes Pierce produced the highest average yield, 260.4 bu. per acre. In irrigation tests the plats irrigated 3 times produced higher yields than those irrigated 1, 2, or 4 times.

Directions are given for producing, harvesting, and storing the potato crop.

Ramie (Rhea), China grass, H. A. CARTER (*London, New York, Melbourne, and Tokyo, 1910, pp. VII+140, pls. 28*).—The author discusses varieties of ramie and their soil and climatic requirements. Directions are given for producing the crop, for decortication of the fiber and its preparation for market, and for its manufacture into yarns, cloth, and other articles.

A contribution on the breeding of rape and turnips, A. HUMMEL (*Illus. Landw. Ztg., 30 (1910), No. 56, pp. 523–526, figs. 11*).—This article embraces discussions of the practical work connected with the breeding of these crops, of the morphological differences of the two plants and their crosses, and of heredity problems in this connection, together with the methods of selection.

The results of experiments in the selection of rape indicate that the number of desirable progeny was greater than the number of undesirable individuals and that on an average the heavier plants produced the more valuable progeny. The author considers that with individual selection the results may be designated arithmetically after the limits of error have been determined and recognized, but that conclusions should not be drawn before the limits of error have been determined, for which from 5 to 6 years of observation are necessary.

The wild rice of tropical Africa, A. CHEVALIER (*Jour. Agr. Trop., 11 (1911), No. 115, pp. 1–3*).—A general description of this native rice (*Oryza barthii*) is given, together with a discussion of its value and its culture by the natives. In addition to this its botanical relationships are considered.

Investigations on the influence of climate on the sugar content of the modern highly bred sugar beet, F. STROHMER (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 6, pp. 919–941, fig. 1*).—The author secured in Úholičky a number of mother beets of the same type and variety and grew several of them for seed in the region of the Brenner Pass, 1,050 meters above sea level, allowing the rest of them to produce seed at Úholičky. The following season the seed produced at these two points was compared at Gross-Zinkendorf in Hungary and at Dürnkrut in Lower Austria, regions with different climatic conditions.

The results showed that the climatic factor had not influenced the content of sugar, ash, or nitrogenous substances, and, further, that mother beets high in sugar but low in growth, although yielding comparatively small seed balls with a reduced germinating power, are nevertheless capable of producing among their progeny individuals of the best quality. The author, however, advises against the use of such seed for breeding purposes on account of the reduced germinative energy, which may at times result in an imperfect stand.

Correlation between weight and sugar content in beets, H. PLAHN (*Centbl. Zuckerindus., 19 (1911), No. 18, pp. 572, 573*).—In discussing this subject the author points out that some of the beets grown from seed of the same mother plant often show a tendency toward intense growth, while other individuals, although selected on the basis of weight, seem to indicate that an increase in weight of the individual is possible only at the expense of the sugar content.

Observations were made on individuals grown from seed of 50 different plants and it was found that in some instances the average polarization of heavy beets, or those weighing over 1,000 gm., was approximately the same as the average polarization of light beets, or those weighing under 1,000 gm. The author regards this as indicating that where the polarization is about the same, the strains are capable of being increased in weight, while in those instances in which the polarization differs to a perceptible extent the limit of sugar content has been reached. A table is presented showing the relation between sugar content and weight in different strains, for the purpose of illustrating his views.

Methods of making germination tests of sugar-beet seed, H. Plahn (*Bl. Zuckerrübenbau, 18 (1911), No. 3, pp. 38–41*).—The author points out the unreliability of the germination test of sugar-beet seed as usually made. He contends that the samples should be graded according to the size of ball, each grade then tested separately, and the results averaged with reference to the percentage each grade represents of the whole sample. The results of testing a sample of seed by the usual and the proposed methods are given in tables for comparison.

Test of treated and untreated beet seed, H. K. Günther (*Bl. Zuckerrübenbau, 17 (1910), No. 24, pp. 389–393*).—Results reported of experiments with treated and untreated beet seed show that in every instance a beneficial effect on the yield of beets and on the sugar content was observed as apparently due to impregnating the seed balls with certain chemical solutions or in paring down or removing the coat of the seed ball before planting.

Fifteen years' practical experience in beet seed production, H. Schmidt (*Bl. Zuckerrübenbau, 17 (1910), Nos. 10, pp. 161–165; 11, pp. 177–181*).—This article describes in detail the production of sugar-beet seed and points out the market requirements for it in Germany and Austria. Tables are given showing the required germinating capacity as based on the size of ball and the latitude allowed in making the germination tests.

Tests of 6 varieties of wheat, H. Compain (*Ann. École Nat. Agr. Rennes, 3 (1909), pp. 147–154, figs. 6*).—In connection with a comparison of the six different varieties the method of clipping the grain when young to prevent a possible lodging was tested. These varieties all made good growth during the winter and were in very vigorous condition at the end of April so that lodging later on was feared. On May 8, the plants on one-half of each plat were clipped, this consisting in removing the extremity of the leaves.

The results showed that in some varieties there was an apparent gain in yield due to clipping, while in others no advantage was discernible and in the case of 2 varieties it proved a disadvantage.

The heating of seeds, E. Miège (*Ann. École Nat. Agr. Rennes, 3 (1909), pp. 141–146*).—In the experiments reported here, seeds were heated at 30, 45, and 70° C. for 3, 6, 12, and 24 hours.

After 6 hours of heating at 30°, the weight of the seeds had not changed, but after 6 hours of heating at 70°, hull-less barley had lost 0.47 per cent of its weight, hulled oats 0.22, barley 0.35, oats 0.37, wheat 0.47, corn 0.87, and sugar-beet seed and buckwheat 0.14 per cent. After 24 hours of heating the loss in weight in some cases had about doubled.

In general the results of heating did not show a marked advantage. In some cases it was found that as a result of the desiccation the physiological maturity, when the seeds are fresh, was apparently improved.

Weeds and how to eradicate them, T. Shaw (*St. Paul, Minn., 1911, 3. ed., rev., pp. 236, pl. 1, figs. 21*).—The subject of weeds is treated in a comprehensive manner, individual species are described, and methods for their eradication and control, including the use of sprays are presented. Among the different topics to which chapters are devoted in the book are the injurious effects of weeds, the possibility of their destruction, agencies concerned in their distribution, the methods and principles generally applicable in destroying weeds, the methods of eradicating weeds of the thistle family, the means of destroying weeds of the mustard family, the specific modes of combating the weedy grasses, and the eradication of miscellaneous troublesome plants.

HORTICULTURE.

The fruit growers' guidebook, B. H. Favor (*St. Joseph, Mo., 1911, pp. 285, figs. 60*).—A popular manual of fruit growing intended as a guide for beginners and as a handy reference work for the commercial orchardist. The subject matter is discussed under the headings of the orchard, orchard heating, thinning and harvesting, packing, spraying, orchard pests and diseases, principles of pruning, profits in fruit growing, and small fruits.

Fruit growing at Weraroa Experimental Farm, W. A. Boucher (*Jour. New Zeal. Dept. Agr., 2 (1911), No. 3, pp. 143–153*).—This consists of notes and tabular data on varieties of orchard and small fruits being tested at the Weraroa Experimental Farm.

Suggestions on commercial muskmelon growing, E. Walker (*Arkansas Sta. Circ. 9, pp. 4*).—The phases discussed include fertilizers, preparing the land, getting a stand, transplanting melons as related to earliness, hardening off the plants, the use of panes of glass for forcing the seed in the field, varieties, and harvesting.

Spraying cucumbers and cantaloups, T. C. Johnson (*Virginia Truck Sta. Bul. 5, pp. 85–100*).—Cooperative field experiments for the control of anthracnose and mildew conducted during the summers of 1908 to 1910 inclusive are reported, together with a résumé of experiments conducted at the station in 1910 to determine the relative efficiency of a number of different sprays as a means of controlling these diseases.

In 1908, with 3½ : 6 : 50 Bordeaux applied 3 times with cucumbers and 4 times with cantaloups, there was a net return for the increased yield of $46.70 per acre for cucumbers. The sprayed portion of the cantaloup field yielded at the rate of 10,000 melons per acre while the unsprayed portion yielded 3,500 melons per acre, and the sprayed melons sold at an increased value of from 25 to 30 cents per hundred, owing to their better quality.

A similar experiment in the control of anthracnose on cucumbers in a commercial field was made in 1909 in which the object sought was to prolong the bearing period until after the bulk of the crop from earlier plantings had been marketed. The vines sprayed with Bordeaux yielded at the rate of 144½ bbls. per acre and the unsprayed vines 109 bbls. The variation in yield became more marked as the picking season advanced. The sprayed vines still bore a fair yield when plowed under on August 2, while the unsprayed vines were dead.

In a similar commercial experiment conducted in 1910, 8 applications of Bordeaux mixture were made, beginning June 18 and at subsequent intervals of a week or 10 days. The increased production resulted in a net gain of $25.56 per acre.

In the station tests there was applied Bordeaux mixture 3 : 6 : 50; Sulfocide used first one part with 200, and later with 250, parts of water; self-boiled lime-sulphur 8 : 8 : 50; and commercial lime-sulphur at the rate of 1 part to 50, 75, and 100 parts water. The efficiency of the sulphur sprays used at the rates given seemed to be entirely insufficient to justify their further use as a fungicide for this class of plants, and they injured the foliage more or less seriously. As compared with the check plats, Bordeaux mixture increased the yield of cucumbers 59.1 per cent while Sulfocide, self-boiled lime-sulphur, and commercial lime-sulphur caused losses of 11.4, 24.8, and 65.8 per cent, respectively. In the cantaloup plat Bordeaux mixture increased the yield 11.2 per cent and Sulfocide, self-boiled lime-sulphur, and commercial lime-sulphur reduced the yield 31.3, 23.4, and 70.2 per cent, respectively.

Orchard and garden spraying, A. G. Ruggles and E. C. Stakman (*Minnesota Sta. Bul. 121, pp. 3–32*).—The various insecticides and fungicides are discussed in detail and notes are given on the principal diseases of fruits and vegetables with suggestions for their control, notes on spraying machinery, and other data. A spray calendar is included.

Spray and practice outline for fruit growers, 1911, H. J. Eustace and R. H. Pettit (*Michigan Sta. Spec. Bul. 54, pp. 20, figs. 7*).—This outlines the methods of control for the more common insects and diseases of the apple, peach, pear, plum, cherry, grape, currant, gooseberry, raspberry, blackberry, dewberry, strawberry, and potato, and gives directions for preparing various fungicides and insecticides.

Spraying the apple orchard, A. Dickens and T. J. Headlee (*Kansas Sta. Bul. 174, pp. 253–292, figs. 19*).—Demonstration experiments conducted in 1910 cooperatively by the Kansas Station, the United States Department of Agriculture, and the owners of 7 orchards in different localities are described, together with an additional experiment conducted to determine the relative value of Bordeaux and lime-sulphur in preventing apple blotch in an orchard hitherto so badly infested as to destroy practically the entire crop. Recommendations relative to number and time of sprays, spraying machinery and materials, and the method of application are also given.

In the demonstration experiments 3:4:50 Bordeaux plus 2 lbs. of lead arsenate was compared with 2 lbs. of lead arsenate plus 1½ gal. of prepared lime-sulphur testing 33° Baumé and 50 gal. of water. In most cases applications of each mixture were applied at the opening of the buds, at the fall of the petals, and 3 weeks later. A fourth application of 2 lbs. of lead arsenate to 50 gal. of water was applied to each lot of sprayed trees 10 weeks after the falling of the petals. The data secured were based on the examination of 256,240 apples and are deemed sufficient to make the results of commercial importance.

Percentage of total yield of apples injured by, or free from, insect attacks, fungus diseases, and spray injury, in spraying trials.

Kind of injury.	Bordeaux.	Lime-sulphur.	Check.
	Per cent.	*Per cent.*	*Per cent.*
Codling moth	7.21	5.09	26.80
Curculio	28.97	32.40	52.50
Scab	2.58	1.30	17.98
Apple blotch	7.42	13.85	23.80
Sooty blotch	2.05	4.38	21.35
Bitter rot	4.90	6.34	10.84
Black rot	0.25	1.93	3.01
Spray injury	19.48	4.02	....
Fruit absolutely free from insect and fungus injury	59.60	53.04	12.90

The average cost per tree for the Bordeaux-lead-arsenate treatment was 37 cts. and for the lime-sulphur-lead arsenate treatment 40 cts. In general, carefully sprayed trees gave an average of 37 per cent more merchantable fruit as compared with untreated parts of the same orchard. The first 2 grades of fruit were increased 15 per cent and 6.6 per cent, respectively. When sold as "orchard run" the average net increased value from the sprayed fruit was $97.20 per acre.

Both lime-sulphur and Bordeaux checked apple blotch materially in the orchard badly infested, the Bordeaux being more effective when apple blotch alone considered. Three sprayings proved better than 2. Arsenate of lead was used with both sprays in the first 2 applications. It was found that whereas the trees injured by Bordeaux produce about as much merchantable fruit as those injured by lime-sulphur, they produce less first grade and more second grade fruit than the latter. One variety, the Ingram, was practically free from Bordeaux injury. In general, prepared lime-sulphur plus lead arsenate produced the best results on apples which are subject to Bordeaux injury and are nearly free from apple blotch, while Bordeaux-arsenate of lead gave the best results on varieties subject to apple blotch.

How to control the scab and blotch of the apple, J. L. Hewitt (*Arkansas Sta. Circ. 7, pp. 4*).—This is a popular discussion of the general characters and methods of dissemination of apple scab and apple blotch, together with directions for summer spraying of orchards that are infested with these diseases, codling moth, and curculio. The treatment recommended consists of 5 applications of Bordeaux mixture, the second, third, and fourth containing 2 lbs. of arsenate of lead to every 50 gal. of the spray. Lime-sulphur may be substituted in the first 3 sprayings.

Self-boiled lime-sulphur wash and its use, P. F. Williams and J. C. C. Price (*Alabama Col. Sta. Bul. 152, pp. 12, pls. 3, figs. 3*).—Descriptions are given of brown rot (*Sclerotinia fructigena*), peach scab (*Cladosporium carpophilum*), and plum curculio, together with directions for the preparation and application of the self-boiled lime-sulphur mixture and of arsenate of lead for combating these pests.

The results of experiments with lime-sulphur on apples and peaches at Auburn, Ala., are also reported. In the apple orchards 98 per cent of perfect fruit was obtained by 3 sprayings, the first a 2:3:50 arsenate of lead spray for the codling moth, and the other two consisting of 8:8:50 self-boiled lime-sulphur mixture for the black and bitter rots.

In the experiments with Carman, Elberta, and McKinnel peaches the respective percentages of perfect fruit were with spraying 97.6, 92, and 89, and without spraying 48.6, 75, and 0. An orchard of 1,500 peach seedlings left unsprayed during the season of 1909–10 showed only a 2 per cent resistance to brown rot. It is claimed that in the work with peaches and apples much of the success with summer treatment depends upon previous pruning and thorough winter spraying with the concentrated lime-sulphur.

The reserve materials of the vine, J. L. Vidal (*Rev. Vit., 35 (1911), Nos. 895, pp. 157–162; 896, pp. 189–195; 897, pp. 219–222; 900, pp. 307–312; 903, pp. 390–395, figs. 6*).—The author finds from a study of the carbohydrates in vines that the root is the reserve organ and that there is a double annual migration of reserve materials. A portion of the reserve materials flows upward in the spring with increasing rapidity until the young leaves begin to function, when the flow decreases and the materials assimilated by the leaves soon begin to migrate to the shoots, trunk, and roots. The maximum reserve in the shoots is reached just before leaf fall and is immediately followed by a sudden retreat of a part of the reserves to the roots, after which the vine enters into the winter rest period, which the author terms the period of "inversion." Grafted vines comport themselves in a way more or less similar to vines growing on their own roots, depending upon the degree of affinity between stock and scion.

The various practices of pruning are grouped into two classes, according to their time of application—those which are conducted during the period of "inversion" and those which are conducted at other times of the year. Pruning during the "inversion" period appears to be more favorable to the vegetation as well as to the quality and quantity of the products of feeble and normal vines and in conjunction with proper treatment, such as the lengthening of the fruiting wood, reduction of manure, etc., of vigorous vines also. Severe pruning during the "inversion" period combined with repruning just before the buds open may perhaps retard the vines and protect them from late frost. Pruning during the "inversion" period is better for the plants producing propagating wood, and should be practiced, contrary to the general rule, on stock intended to be grafted in place in spring. On the other hand, pruning during the "inversion" period is not so well suited for the gathering of cuttings and scions. Very early pruning or very late pruning impoverishes the plants of the reserve materials and diminishes their vigor in proportion as the pruning is remote from the "inversion" period. On the other hand, it is efficacious against excessive vegetation and is the best for the taking of cuttings and scions.

Preparing citrus fruits for market, W. C. Temple (*Fla. Grower, 3 (1911), No. 32, pp. 3-6, figs. 7*).—This article deals with harvesting and packing-house methods, including illustrations of first-class packing-house equipment.

Experimental tea plats, Peradeniya, M. K. Bamber and J. A. Holmes (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1911), No. 15, pp. 201-208*).—Results for 1910 are given for the pruning, cultivation, and manuring experiments with the experimental tea plats at the Peradeniya experiment station (E. S. R., 23, p. 243). Summarized data are also given showing the yields of tea on the various plats from 1906 to 1910 inclusive.

Home floriculture, C. N. Page (*Des Moines, Iowa, 1911, pp. 173, figs. 48*).—A popular guide for the growing of flowers in the house and garden, including suggestions on cut-flower work, garden design, etc.

The gladiolus, M. Crawford (*Chicago and New York, 1911, pp. 98, pls. 7, figs. 2*).—A practical treatise on the culture of the gladiolus, with notes on its history, storage, diseases, etc. An appendix by W. van Fleet deals with the garden history of the gladiolus, hybridizing gladiolus, and special care of seedlings, together with brief notes on gladiolus species.

FORESTRY.

The taxation of forest lands in Wisconsin, A. K. Chittenden and H. Irion (*Madison, Wis., 1911, pp. 80*).—The results are given of a study of forest conditions in Wisconsin conducted cooperatively by the Wisconsin State Board of Forestry and the Forest Service of the United States Department of Agriculture in April, 1910.

The main purpose of the study was to determine the extent of the burden now carried by timber lands as a result of the present methods of taxation and what influence, if any, such methods of taxation have or will have on the practice of forestry by private owners. Ten counties considered typical of the northern part of the State were selected for detailed study. In addition as much information as possible was collected in the other counties of the State. A general description is given of the area specially studied relative to the character of the land and timber, cut-over lands, settlement, agricultural development, annual cut, and importance of the lumber industry. A summary is given of assessed values compared with actual values and a few typical examples of actual taxation are further discussed, together with the methods of assessing timber lands, views of lumbermen on taxation, the attitude toward fire, tree belt, and forest plantation laws, tax laws in other States, and probable returns from forest investment.

The general conclusion relative to the taxation of forest lands is that the present method of assessing forest lands is exceedingly uneven and in many cases unfair to the timber-land owner. Recommendations are made for the formulation and application of a remedy, the proposed solutions being discussed under the headings of wood lots limited in area and private forests without any limitation as to area. It is pointed out that even with the adjustment of the tax laws, the development of forestry by private capital is not apt to be extensive enough to furnish a sufficient supply of timber in the future.

An article by F. R. Fairchild on the economic problem of forest taxation is appended almost in full.

Shall States regulate the management of private forests? H. H. Chapman (*Amer. Forestry, 17 (1911), No. 2, pp. 82–88, pls. 2*).—An examination of the principles of state regulation with special reference to the control of private forests.

The author recommends the encouragement of private forestry through the dissemination of forestry propaganda, the establishment of demonstration forests, and improving the systems of fire protection and forest taxation. He also advocates the state ownership and control of lands most in need of a perpetual forest and a reasonable degree of regulation of lands where the indirect influence of the forest on streams and erosion is clearly proved.

The National Forest manual.—Special uses (*U. S. Dept. Agr., Forest Serv., 1911, pp. 35*).—This manual, which constitutes a part of the Use Book (E. S. R., 24, p. 548), consists of regulations of the Secretary of Agriculture and instructions to forest officers relating to and governing special uses of the National Forest lands.

Fifth annual report of the Forest Park Reservation Commission of New Jersey for the year ending October 31, 1909 (*Ann. Rpt. Forest Park Reserv. Com. N. J., 5 (1909), pp. 56, pls. 5*).—This report deals chiefly with the question of forest fires. A summary is given of forest fires in 1909, violations of the law, and the cost of the fire service, together with a discussion of fires in other States, railroad fires, the forest fire service, state forest reserves, educational work, forest planting, shade trees, tree enemies, the needs of the state forest service, and a financial statement for the year.

[Forestry in North Carolina], J. H. Pratt and J. S. Holmes (*N. C. Geol. Survey, Bien. Rpt. 1909–10, pp. 53–105*).—This consists of a progress report on operations along various lines of forestry conducted by the North Carolina Geological and Economic Survey during the fiscal years 1909 and 1910. The work under way consists of an investigation of the forest conditions of North Carolina, studies of forest fires and of the wood-using industries of the State, the examination of timber areas in regard to practicing scientific forestry, the examination of watersheds belonging to municipalities as to their protection against fire and contamination, and investigations regarding the reforestation of abandoned farm lands and cut-over lands.

Forestry in Russia, L. S. Wood (*Quart. Jour. Forestry, 5 (1911), No. 2, pp. 101–119*).—This consists of a report on the examination of about 309,951 acres of timber land in the Province of Perm, Russia, including data relative to the nature of the stands and growth measurements of sample areas and trees.

The climatic differences upon northern and southern slopes in their relation to the water content of clean-cut and forest-covered soils, R. Wallenböck (*Centbl. Gesam. Forstw., 37 (1911), No. 2, pp. 51–63*).—The results are given of soil moisture determinations made in the years 1909 and 1910 on clean-cut areas and on soils covered with mature beech stands, both on northern and on southern exposures. The season of 1909 was classed as a dry season and 1910 as a wet season.

The results secured from the determinations as a whole show that the water content of the soils is greater on clean-cut areas than on beech stands, both on northern and southern slopes and in dry and wet years. In wet years the clean-cut areas take up more moisture on southern slopes and less moisture on northern slopes than mature beech stands on the corresponding slopes. The difference in water content of the cleared areas and the forest soils is greater on the sunny slope during a wet season and greater on the shady slope during a dry season. The difference in water content of the variously exposed cleared areas is greater in dry years and less in wet years than the variously exposed forest areas.

The experimental work reported is preceded by a general discussion relative to the modification through forests and exposure of the climatic elements affecting soil moisture.

A critical discussion of forest manuring experiments, P. EHRENBERG (*Ztschr. Forst u. Jagdw., 43 (1911), No. 3, pp. 174–202*).—A critical inspection of the present methods of conducting fertilizer experiments with young trees and with mature stands, both from the theoretical and scientific points of view.

The utilization of machinery in the culture of pines with special reference to the sowing of pine seed in plowed furrows with the aid of a fertilizer distributor and forest seed planter, SCHENK VON SCHMITTBURG (*Allg. Forst u. Jagd Ztg., 87 (1911), pp. 58–63; pp. 77–84, fig. 1*).—The author points out the difficulty of securing sufficient and capable laborers for the work of establishing pine stands as the principal necessity for the utilization of machinery for this purpose. His practice of sowing pine seed in plowed furrows and subsequent cultivation between the rows is here compared with the usual method of sowing pine seed broadcast. A fertilizer distributor and seed planter devised by the author to plant forest seed is illustrated and described, and detailed estimates are given of the cost of sowing and maintaining for the first four years 1-hectare plantations set out or seeded by hand and seeded with the seed planter.

Harvesting the annual seed crop, S. MOORE (*Amer. Forestry, 17 (1911), No. 3, pp. 145–154, pls. 4*).—The conditions and work of harvesting the forest-tree seed crop described in this article are deemed particularly typical of the Rocky Mountain region and the work as carried on by the Forest Service of the United States Department of Agriculture upon the National Forests of that region.

The growth and management of Douglas fir in the Pacific Northwest, T. T. MUNGER (*U. S. Dept. Agr., Forest Serv. Circ. 175, pp. 27, figs. 4*).—The purpose of this circular is to show how a new crop of timber can be started on logged-off land, the conditions favorable to its development, its rate of growth and yield, and the probable cost of securing the second crop. The Douglas fir, which is selected as the most abundant and most important commercial tree of the Pacific Northwest, is discussed relative to its important characteristics, including soil and climatic requirements, density of stand, susceptibility to injury by fire, fungi, and insects, reproduction, rate of growth, and management of second growth stands, including provisions for a second crop, yields, costs, and profits. The appendix contains tabular data showing the cubic and merchantable contents, as well as the number of hewed railroad ties and round mine timbers obtainable from trees of different diameters

The general conclusion is reached that Douglas fir is the best all-round timber tree for the Pacific Northwest and that reforestation can be attained at little expense after any Douglas fir logging operation by making provision for seed trees to seed up the areas; burning the slashing immediately after logging; and protecting the cut-over area from subsequent fires. By observing these measures the growth of the second crop will be as rapid and the quality as good as the original forest. "That the growing of crops of Douglas fir on cut-over land will be financially profitable to private owners seems assured in view of the certain rise in the valuation of stumpage, the growing security of timberland investments, and the increased market for young timber, provided only that the system of taxing timberlands is reformed so that such lands bear only their just share of taxation."

Trees of the Tasmanian forests of the order Myrtaceæ: The genus Eucalyptus, L. RODWAY (*Agr. and Stock Dept. Tasmania Bul. 17, 1910, pp. 15*).—This consists of a general account of the genus Eucalyptus, together with botanical descriptions of the various Tasmanian eucalypts and additional notes on the general appearance of the more common forms in the forest.

The tree species of Java: Contribution No. 12, S. H. KOORDERS and T. VALETON (*Meded. Dept. Landb. [Dutch East Indies], 1910, No. 10, pp. VI+782*).—This is the twelfth of a series of reports on the tree species of Java which have been published from time to time and the first of which appeared in 1894.

The present report gives the contents of the previous volumes and deals specifically with the species and genera of Buxaceæ, Euphoriaceæ, Ulmaceæ, and Urticaceæ. In addition to full botanical descriptions the information under each species includes references to literature and notes on the geographical distribution, uses, and native names of the trees.

The virgin forests of Kamerun, JENISCH (*Tropenpflanzer, Beihefte, 12 (1911), No. 1-2, pp. IV+199, pls. 6, figs. 11*).—During 1908–9 the author in conjunction with Prof. Büsgen made a survey of the forests of certain sections of Kamerun and Togo. A general account of this trip, dealing with the forest conditions, possibilities, and botany has been previously noted (E. S. R., 21, p. 741). The present report embodies the results of investigations made relative to the composition and character of the areas examined, and gives the author's conclusions relative to the utilization and conservative exploitation of the forests, together with considerable information of value in the establishment of private wood-using industries.

The appendixes contain tabular data on sample areas examined, growth measurements and descriptions of a number of species relative to their technical application, estimates relative to the cost of establishing wood industries, and soil analyses.

A study of the wood-using industries of Kentucky, R. E. SIMMONS (*[1910], pp. 74, pls. 11*).—The results are given of a statistical study, conducted cooperatively by the Forest Service of the United States Department of Agriculture and the State of Kentucky, of the industries of that State which use wood in the manufacture of finished products. The tabular data given and discussed show the source of each of the woods used by the manufacturers, whether grown in Kentucky or elsewhere, the quantity used, prices paid delivered, uses to which the various species are put in making the commodities or portions of commodities, and the extent of the field over which products are distributed.

The total estimated quantity of wood consumed by the Kentucky manufacturers making products in form ready for the ultimate consumer is 780,141,800 ft. b. m., costing delivered at the factory $15,160,374.

Wooden and fiber boxes, H. MAXWELL and H. S. SACKETT (*U. S. Dept. Agr., Forest Serv. Circ. 177, pp. 14*).—This circular embraces the results of an investigation conducted to determine to what extent the fiber box has replaced the wooden one, how far the development of the fiber box industry is likely to go, and what effect, if any, the growing use of fiber boxes will have in bringing about the fullest utilization of forest-grown material. Both industries are discussed relative to their nature, extent, and rival claims of merit.

The two kinds of boxes as compared show in general that the cheapness of fiber is the most stubborn factor in the competition with wood, but that this competition is active only for rather small boxes and for those for which extra strength is not demanded. The prospect seems good that material for both kinds will be adequate to meet the demand for many years and that the majority of shipping boxes will continue to be made of wood. The wood waste at sawmills and in the forests is suggested as material for fiber making, practically the only difficulty in its use being the fact that such waste is scattered and the cost of collecting it may be considerable.

Rubber: Production and utilization of the raw product, C. Beadle and H. P. Stevens (*London, Bath, and New York* [*1910*], *pp. X+132, pl. 1, figs. 30*).—A popular work intended as an introduction to the study of rubber and dealing both with the production of the raw material and the subsequent manufacturing processes.

DISEASES OF PLANTS.

Methods of keeping bacteria from growing plants, J. K. Wilson and H. A. Harding (*Abs. in Science, n. ser., 33* (*1911*), *No. 849, p. 545*).—The method suggested is the growing of plants in sterile Mason jars, using sterilized seed and soil wherein exchange of gases is provided for by soldering a ½-inch tube into the metal jar top, plugging the tube with cotton, and covering it with an inverted test tube to reduce the chances of contamination and check evaporation. Alfalfa plants in such jars in sterilized sandy soil, to which 10 per cent of water had been added, grew thriftily during 4 months without being watered or the jars opened.

Investigations on the dissemination of microscopic spores in the atmosphere, G. Bonnier, L. Matruchot, and R. Combes (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 11, pp. 652–659, fig. 1*).—By a suitable apparatus, which is figured and described, the author determines the number of spores in a given volume of air (50 liters), as shown by plate colonies.

The influence of the culture media on the growth of the organisms and that of vegetation and of altitude on the dissemination of spores were investigated. It was found that the kind of culture media used had a very appreciable influence on the number of colonies of a given species that would show on the plates. The air from dense forests showed more fungi and bacteria than that from open places. The higher the altitude the fewer the colonies, until at a height of 2,190 meters only 64 colonies of fungi and none of bacteria were obtained.

In every instance the number of colonies of fungi were far in excess of the bacterial colonies. For instance, in forests there were 3,260 colonies of fungi and only 13 of bacteria.

New or rare species of fungi in the environs of Palermo, G. E. Mattei (*Bol. R. Orto Bot. Palermo, 9* (*1910*), *No. 1–3, pp. 140–144*).—Of 23 fungi noted, 13 are described as new by Saccardo, viz, *Ascochyta semeles* on the leaves of *Semele androgyne; Asteroma antholyzæ* on the leaves of *Antholyza bicolor; Asteroma ceramioides* on the dead stems of *Smyrnium olusatrum; Glœosporium anceps* on the leaves of *Arbutus unedo; G. crini* on the dying leaves of Crinum in company with *Phyllosticta crini; G. oleandri* on the leaves of *Nerium oleander; Marsonia matteiana* on the dying leaves of *Quercus robur; Penicillium coccophilum* on the shields of *Ceroplastes rusci*, adhering to the branches of *Ficus capensis* and parasitized by *Thoracantha cyanea; Phyllosticta crini* on the dying leaves of Crinum; *P. paratropiæ* on the living leaves of *Paratropia rotundifolia; Septoria cirrosæ* on the dying leaves of *Clematis cirrosa; S. dryophila* on the leaves of *Quercus ilex;* and *Stilbum coccophilum* on the shields of *Ceroplastes rusci*, adhering to the branches of *F. capensis* and parasitized by *Thoracantha cyanea*.

A method of developing Claviceps, H. H. Whetzel and D. Reddick (*Phytopathology, 1* (*1911*), *No. 2, pp. 50–52, pl. 1*).—The authors report the successful development of stromata from the sclerotia of *C. purpurea*, which in August had been inclosed in a screen wire and put on the ground under a grape arbor until April of the next year, then carried into the laboratory and placed in moist sand in a covered stender dish.

The smuts of grain crops, E. M. Freeman and E. C. Stakman (*Minnesota Sta. Bul. 122, pp. 35–64, figs. 11*).—This is a general discussion of the life histories of the common smuts of grain in Minnesota and of methods of treating each. The smuts discussed are corn smut, oat smut, stinking smut of wheat, covered smut of barley, sorghum grain smut, and loose smut of wheat and of barley. Directions are given for using the formalin, copper sulphate, and hot-water treatments.

Studies of the life history of the head smut of sorghum, A. A. Potter (*Science, n. ser., 33 (1911), No. 849, p. 551*).—In a paper read before the Botanical Society of Washington March 7, 1911, the author presented the results of his investigations on the life history of this smut.

Attempts to prevent this smut by seed treatment have failed. Numerous inoculation experiments are reported, but neither local infection, seedling infection, nor floral infection was demonstrated. Detailed histological study has shown that the host plant is affected as a whole, and therefore that the infection must take place at an early stage in the growth of the host. Peculiar floral alterations were shown to be caused by the smut and to contain the smut mycelium, from which it is suggested that the smut may be hereditary, as is the fungus of certain species of Lolium.

Infection experiments with legumes, K. Brux (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 9 (1911), No. 3, pp. 35–41, figs. 2*).—The results of infection experiments with red clover and serradella are reported. The yields of green matter on the inoculated areas showed a marked increase over similar uninoculated plats.

Studies in disinfection of alfalfa seeds, J. K. Wilson (*Abs. in Science, n. ser., 33 (1911), No. 849, pp. 544, 545*).—The results are given of sterilizing experiments with alfalfa seeds, in which 70 per cent alcohol, 1:1,000 corrosive sublimate, 10 per cent formaldehyde, 95 per cent alcohol for 10 minutes and then followed by 10 per cent formaldehyde, and a vacuum chamber treatment in water followed by 10 per cent formaldehyde, were tried.

None of these completely sterilized the seed except the 95 per cent alcohol 10-minute treatment followed by a 6-hour soaking in 10 per cent formaldehyde, and the germination of the seeds was reduced 65 per cent by this treatment. In the water-vacuum-formaldehyde treatment, pressure 3 mm., time 210 minutes, followed by a 30-minute soaking in 10 per cent formaldehyde, some of the seed were sterilized, but their germinating power was destroyed, from which the author concludes that the air in the seeds probably prevented the entrance of the disinfecting solutions thereby protecting the bacteria.

A contribution to our knowledge of the morphology and life history of Puccinia malvacearum, J. J. Taubenhaus (*Phytopathology, 1 (1911), No. 2, pp. 55–62, pls. 3*).—In a general study of the life history of this fungus, 2 common types of sporidial formation were observed, first, from free cells formed by the breaking up of the promycelium, and second, the normal sporidia formed on the stergimata. This fungus winters over as (1) living mycelium, as late fall infections develop through the winter and mature their spores in the spring, (2) hilbernating teleutospores on old twigs or dead leaves, and (3) on the seeds or bracts, but not in the embryo.

Disease-resisting potatoes, G. M. Taylor (*Gard. Chron., 3. ser., 49 (1911), No. 1265, p. 181*).—In searching for an immune variety of a cultivated potato to be used for breeding disease-resistant strains, the author found in Scotland a potato which had been grown by one family since 1745 and was said never to have been attacked by disease. This variety has been subjected to severe tests as to disease resistance for the past 10 years, but has never shown any signs of disease. It produced no pollen until 1910, and was also sterile to all pollen of other varieties, but by using its pollen on the varieties Factor and Admiral, fertilization occurred and an abundance of good seed was obtained. This immune variety is of excellent edible quality, and although the color of its tubers and its low yield make it worthless as a commercial potato, its progeny should develop some very valuable disease-resistant strains.

The potato eelworm, S. B. DOTEN and P. FRANDSEN (*Nevada Sta. Bul. 76, pp. 7, figs. 2*).—This bulletin gives a popular discussion of the characteristics of this pest, the damage done by it, and methods of control.

The potato eelworm, S. B. DOTEN and P. FRANDSEN, trans. by MARIE TROSI (*Nevada Sta. Bul. 76, pp. 7, figs. 2*).—An Italian edition of the above.

On the presence of Tilletia horrida in rice flour, P. FILTER (*Centbl. Bakt.* [*etc.*], *2. Abt., 29 (1911), No. 12–14, pp. 342–346, figs. 4*).—Attention is called to the frequent presence of spores of this smut in rice flour, indicating a more general distribution of this fungus than hitherto supposed. According to the author, *T. corona* is only a synonym of *T. horrida*.

A new myxomycete on sugar beets, B. NEMĚC (*Ber. Deut. Bot. Gesell., 29 (1911), No. 2, pp. 48–50*).—The author describes as new a chytridiaceous parasite which is found in the cortical cells of the side roots of the sugar beet. It does not produce hypertrophy of the attacked cells.

He proposes *Sorolpidium betæ* n. g. and sp. as the name of this organism.

Root tumors of sugar beet (*Jour. Bd. Agr.* [*London*], *17 (1911), No. 10, pp. 830, 831, pl. 1*).—Attention is called to the occurrence in England of tumors on the crowns of the sugar beet, a disease which has long been prevalent in many beet-growing regions on the Continent.

Experiments on the control of Phytophthora on tobacco, H. JENSEN (*Jaarb. Dept. Landb. Nederland. Indie, 1909, pp. 192–197*).—The results are given of experiments with lime and ammonium sulphate, nitrate of soda, carbon bisulphid, formalin, and potassium permanganate in combating the Phytophthora. It was found that both carbon bisulphid and potassium permanganate appreciably checked the Phytophthora without injury to the tobacco plants.

Injury caused by the apple powdery mildew, W. H. VOLCK (*Better Fruit, 5 (1911), Nos. 8, pp. 39–46, 59–61, figs. 9; 9, pp. 60–69*) —In a general discussion of the characters of this disease, the damage caused by it, and methods used for its control, the author gives the results of a series of experiments with various fungicides in combating this mildew under California conditions.

The following substances were used as winter sprays in an attempt to kill the fungus on the mildewed twigs: Copper sulphate, Bordeaux mixture, sulphuric acid, iron sulphate and sulphuric acid, lime-sulphur solution, lime-sulphur and salt, lye-sulphur solution, potash and soda-lye sulphids and excess of lye, and lime-sulphur solution and copper sulphate. Pruning off infected twigs was also tried as a remedy. Treatments during the growing season, both curative and preventive, were also tried, as follows: Bordeaux mixture, copper sulphate, ammoniacal copper carbonate, copper acetate, copper carbonate, copper benzoate, copper hydroxid, copper sulphid, metallic copper, copper sulphid plus sulphur, iron sulphid, iron sulphid plus sulphur, sulphur (in various forms), sulphuric acid, lime-sulphur solution, lime-sulphur solution plus barium carbonate, potassium sulphid, benzoates (sodium, ammonium, potassium), salicylates (same as benzoates), picric acid, phenol, potassium permanganate, zinc oxid, zinc arsenite, kedzie mixture, arsenate of lead, and pruning.

The wintering-over fungus upon mildewed twigs was so resistant that none of the fungicides killed it, except in the case of the 10 per cent sulphuric acid solution, when the fungus was destroyed because the spray killed all the twigs on the tree, both diseased and healthy. Of the summer sprays used, iron sulphid was the only one giving any promise of controlling the mildew under the conditions as found in the Pajaro Valley. The first iron sulphid spraying for mildew should be applied along with the calyx-cup spraying for the codling moth, and, of course, will contain arsenate of lead; this requires that the sulphid precipitate should be carefully washed to free it from soluble sulphur. For this spraying, 10 lbs. of iron sulphate precipitated with lime-sulphur solution should make 100 gal. of spray, to which 6 lbs. of arsenate of lead is added. The second, as well as subsequent applications, should come after a 3-week interval, and consists of 7 lbs. of copperas precipitated with lime-sulphur solution and then diluted with 100 gal. of water. The third and fourth applications consist of 5 lbs. of copper sulphate and 4 lbs. of lead arsenate to 100 gal. of water. It is stated that this iron sulphid treatment will effect a practical control of the mildew under the existing conditions.

It was found that when trees were sprayed with sulphur solutions they acquired an immunity to sulphur injury if sprayed regularly, while a first and a fourth spraying consisting of some form of sulphur mixture often caused serious loss of foliage, and even fruit from the last spraying. Similar trees given 4 successive applications of the sulphur mixtures at intervals of 3 weeks showed no signs of sulphur injury.

The occurrence of apple blotch in Ohio, W. O. GLOYER (*Ohio Nat., 11 (1911), No. 6, pp. 334–336, fig. 1*).—Attention is called to the presence of this fungus on the Baldwin, Ben Davis, Stark, Pippin, Smith Cider, and Rome Beauty in several counties in Ohio. In one orchard of Pippins 90 per cent of the fruit was blotched, a condition which was not uncommon with many of the varieties named. The disease appeared on sprayed as well as on unsprayed trees, and was due, it is claimed, to a lack of proper pruning, thereby permitting successive crops of spores to be produced on foliage and fruit not reached by the spray.

A summary of various spraying experiments, O. S. WATKINS (*Kinmundy, Ill., 1911, pp. 16*).—In this paper, read before the Fifty-fifth Annual Convention of the Illinois State Horticultural Society at Urbana, Ill., February, 1911, the author gives the results of spraying experiments with various fungicides and insecticides conducted during the summer of 1910 in different parts of the State of Illinois.

Two lines of experiments are reported, one being demonstration experiments designed to show the value of known fungicides and tried methods in renovating old orchards, etc., and the other consisting of detailed experiments intended to answer questions as to the comparative value of different sprays, the use of trade compounds, etc. In the demonstration experiment plats, all the fruit was killed at the time of the second spraying by a severe cold wave. Of the orchards used in the detailed experiments, all had their fruit killed by the cold wave, except the orchard at Neoga which comprised 300 15-year-old Ben Davis apple trees and 12 Grimes Golden trees. Bordeaux mixture, lime-sulphur mixtures, copper ferrocyanid, several proprietary fungicides, different brands of arsenical compounds, and black leaf "40," a tobacco decoction, were tested. Chemical analyses of some 13 proprietary arsenical compounds and commercial lime-sulphur mixtures, and tabulated data as to the tests of these various fungicides and insecticides on both fruit and foliage, are given.

The author concludes that self-boiled lime-sulphur possesses very little fungicidal value in controlling apple scab and is not very adhesive, but was more effective in controlling the scab and less injurious to the foliage than commercial lime-sulphur mixtures. It is claimed that one application of a 4:4:50

Bordeaux mixture proved more effective than 3 applications of lime-sulphur in controlling the scab. Arsenates of lead containing high amounts of arsenic acid, when combined with lime-sulphur, caused more injury to the fruit and foliage than arsenates with a low acid content. The combined action of Bordeaux mixture and milk of lime acted as a shield against the severe freeze of that year.

The use of dilute lime-sulphur for the control of apple diseases, W. M. Scott (*Kinmundy, Ill., 1911, pp. 8*).—In this paper, read before the Fifty-fifth Annual Convention of the Illinois State Horticultural Society at Urbana, Ill., February, 1911, the author briefly reviews the status of lime-sulphur as a fungicide for the control of apple diseases, and gives the results of experiments conducted in Virginia during 1910 with lime-sulphur sprays. In these experiments 4 applications of each of the following sprays, viz, 1 5 : 50 commercial lime-sulphur, 2 : 4 : 50 home-boiled lime-sulphur, and 3 : 4 : 50 Bordeaux mixture, were tested on Winesap, York Imperial, and Ben Davis apples. Two lbs. of arsenate of lead was added to every 50 gal. of the spray used.

The evidence obtained from these and other experiments conducted by the United States Department of Agriculture and by several of the experiment stations, as well as the work of the orchardists, seemed to warrant the following conclusions: Lime-sulphur solution containing 4 lbs. of sulphur to 50 gal. of spray is a good substitute for Bordeaux mixture in the treatment of apple scab, fruit spot, leaf spot, and cedar rust, but is not satisfactory in controlling bitter rot. When necessary to spray for bitter rot the early applications of lime-sulphur for scab may be followed at the proper time with Bordeaux mixture for bitter rot, thus avoiding the russet and yet controlling the rot.

The cherry in Lower Burgundy.—V, Diseases of cherries, P. Larue (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 14, pp. 428–437, fig. 1*).—The author gives a key to the diseases of the cherry, in which the symptoms, the name of the parasite (animal or plant), the group to which the parasite belongs, and the method of control are very briefly noted. The diseases of the leaves are treated first, then the damages done by insects to early buds, and then the diseases of the young shoots, of mature branches, and of the trunk, roots, flowers, and fruit.

Crown swelling disease of peach, J. B. S. Norton (*Phytopathology, 1 (1911), No. 2, pp. 53, 54*).—Attention is called to a serious disease of peach orchards in Maryland which is causing the death of many young trees planted in the spring of 1908 or in the fall of 1907.

In 1909 many of the trees were either dying as if from starvation, or were already dead, having broken off about 2 inches under the ground. An examination of the trees showed but slight connection between the lateral roots and the main root and stem, while there was a distinct swelling at the base of the stem extending upward from 4 to 8 in. A cross section of the tumor showed a spongy layer just beneath the bark of varying thicknesses, composed of parenchymatous cells filled with starch and frequently interpersed with thin woody layers. The large size of the cells, the abundance of starch, and the absence of medullary rays easily distinguished the diseased tissue from healthy wood. The lateral roots seemed to be in the process of being cut off in a way similar to that in which the twigs of willow, poplar, etc., are often shed.

No causative organism was found in the sections, nor in the attempted cultures.

Observations on the California vine disease, O. Butler (*Mem. Torrey Bot. Club, 14 (1910), No. 2, pp. 111–153, pls. 5, fig. 1*).—The author gives the history of this disease, its symptoms, the histology of infected parts, the relationship of the disease to similar diseases such as folletage, rougeot, sun scald, brunissure, shelling, and tetranychosis, and the nature of the disease.

As a result of these investigations the conclusion is drawn that the California vine disease is not of parasitic origin, but is due to some weakness in the functions of absorption and translocation of water which becomes manifest when conditions favoring transpiration are marked.

A new enemy of grapes, E. HAHN (*Umschau, 15* (*1911*), *No. 14, pp. 290, 291, fig. 1*).—Attention is called to the occurrence of *Lathræa clandestina* on the roots of grapevines, where it produces galls at the point of attachment to its host. The immediate uprooting and destruction of the grapevine on the first appearance of this parasite is advised.

On a bacteriosis of the tomato, G. L. PAVARINO (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20* (*1911*), *I, No. 5, pp. 355–358*).—Attention is called to a bacterial disease of tomatoes occurring in Italy, which not only produced a rotting of the fruit but caused the buds and young branches to become twisted and curled, while on the larger branches and stems narrow depressed, brownish, cankered areas developed.

After comparing the characteristics of the causative organism with those of *Bacterium solanacearum*, which produces a similar bacterial rot of tomatoes, the author concludes that the Italian disease is caused by a new species, for which the name *B. briosii* is proposed.

Some diseases of the banana (*Agr. News* [*Barbados*], *10* (*1911*), *No. 233, pp. 110, 111*).—This is a discussion of the Panama disease and similar diseases of the banana in Costa Rica, Panama, Cuba, Trinidad, and Surinam, in which their symptoms and the causes proposed by different investigators are given.

In Costa Rica and Panama the Panama disease is attributed by some investigators to either a fungus or bacterial origin, while in Cuba a similar disease showed the presence of a species of Fusarium in the discolored vascular bundles. In Trinidad 2 stem diseases (moko and Panama) and a root disease (Marasmius) are noted. In Surinam the Panama disease has been very destructive, especially to the Gros Michel variety of bananas. In a recent letter by Essed to the Imperial Department of Agriculture of the West Indies the Panama disease is attributed to the attacks of a fungus named by him *Ustilaginoidella musæperda*, related to the genus Ustilaginoidea which is one of the Hypocreales.

A bacterial disease of bananas and plantains, J. B. RORER (*Phytopathology, 1* (*1911*), *No. 2, pp. 45–49, pls. 4*).—The author describes a bacterial disease of bananas, which was originally discovered on the "moko" fig, a variety of plantain, but which has since been found generally in Trinidad on the Creole and French varieties of plantain, and on the Cavendish banana (*Musa chinensis*).

The disease first affects the lower leaves, causing them to droop and have a slightly yellowish tinge. Soon the petioles give way just at the base of the leaf blade, while eventually the terminal leaf also bends over, and the plant dies and rots down to the ground. Transverse sections of the pseudostem show that practically all the vessels are discolored and filled with bacteria. These yellow, dark brown, or blue-black, discolored bundles run back into the tree stem, and thence into the young suckers and buds.

The organism was isolated and the disease reproduced by inoculating healthy banana plants with the pure cultures. The author holds that this disease is not identical with the Panama disease and that it is also different from the two known bacterial diseases of the banana. The name of *Bacillus musæ* n. sp. is therefore proposed for the causative organism.

The disease has been well controlled in Trinidad on small plantations by the immediate destruction of a diseased plant as soon as it is found, and careful sterilization by fire of all tools used in the work.

Sphæropsis tumefaciens n. sp., the cause of the lime and orange knot, Florence Hedges (*Phytopathology, 1 (1911), No. 2, pp. 63–65, pl. 1*).—The author describes a new species of fungus, *S. tumefaciens*, which produces galls from one-fourth to 3 inches in diameter on the branches of the lime (*Citrus hystrix acida*) and of the orange.

The young tumors are covered by the smooth, green bark, which later usually splits, dies, and falls away, leaving the woody tissues exposed or covered with a softer, more or less crumbly layer about the thickness of ordinary bark. If the mycelium is present in abundance, its dark-colored hyphæ impart a black appearance to the tissues of the knot. The fungus rarely fruits in laboratory cultures, but pycnidia containing spores were finally obtained on a 3-months-old corn-meal flask culture of the orange strain. Thus far no perithecia have been observed, but pycnidia and spermogonia occur in great numbers in artificial infections on the host and in cultures of the vigorously fruiting strains from the corn-meal cultures.

A new disease of mulberries, F. Bubák (*Ber. Deut. Bot. Gesell., 29 (1911), No. 2, pp. 70–74, fig. 1*).—The author describes as new a fungus, *Dothiorellina tankoffii* n. g. and sp., which is found on dead mulberry branches in the stromatic layers of *Thyrostroma kosaroffii* (*Steganosporium sirakoffii*).

On Melanconis modonia, a parasite of the chestnut in Brittany, V. Ducomet (*Bul. Soc. Nat. Agr. France, 71 (1911), No. 1, pp. 99–102*).—A description is given of the symptoms of this disease, often known as black canker, as it occurs in Brittany, where it is common in certain localities.

It is claimed that the disease in this region attacks the tops and branches first, and finally works its way downward toward the roots, causing many branches to die and often ringing the trunk, thereby killing the entire tree. The disease apparently begins in the 1-year-old terminal shoots, and is believed to enter by way of the lenticles.

The black canker of the chestnut, G. Briosi and R. Farneti (*Atti. R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), I, No. 4, pp. 201–207*).—This is a controversial article on the taxonomic position of the fungus *Melanconis perniciosa*, which is claimed by the authors to be the cause of the chestnut canker, and contains critical observations on an article by Griffon and Maublanc (E. S. R., 24, p. 652) in which they claim that *M. perniciosa* and *M. modonia* are identical. The authors, after comparing the characters of the 2 fungi, hold that they are not identical.

The parasitism of Diaporthe parasitica on the chestnut, E. Pantanelli (*Atti. R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), I, No. 5, pp. 366–372*).—In addition to a general review of the history of this disease, the author discusses other varieties of Diaporthe on the chestnut, and the characters, taxonomic position, germination of spores, and general life cycle of this fungus. It is claimed that inoculation experiments have shown that the fungus is capable of attacking Italian chestnuts, and rigid quarantine regulations are therefore advised against all chestnut plants from the United States.

The chestnut bark disease, F. W. Rane (*Boston: State Forester, 1911, pp. 7, pls. 2*).—This is a popular discussion of this serious chestnut disease, in which the author describes its growth and symptoms and methods of control and eradication. It is stated that as yet there is no known method of curing the disease or of saving a thoroughly infested woodland, but in regions where the disease has just appeared the prompt destruction of infected trees at the outset is advised.

Hevea disease in Ceylon (Phytophthora faberi), H. N. Ridley (*Agr. Bul. Straits and Fed. Malay States, 10 (1911), No. 3, pp. 70, 71*).—This fungus attacks both cacao and Para rubber.

In the case of the Para rubber, it attacks the renewing bark on the tapped surfaces, turning it a reddish-purple color, often with a well defined black border, and in advanced cases the bark exudes a purple-brown liquid. Finally the tapped surfaces die back, and black longitudinal streaks appear, which extend through the bark into the wood. The disease is usually discovered by the cessation of latex flow. Intermixed plantations of cacao and Hevea, close planting, and wet weather favor the disease.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

General biology, J. G. NEEDHAM (*Ithaca, N. Y., 1910, pp. XIV+542, figs. 296*).—A book of outlines and practical studies for the general student.

A history of British mammals, G. E. H. BARRETT-HAMILTON (*London, 1910, vol. 1, pts. 1, pp. XVI+8+49–88, pls. 5, figs. 7; 2, pp. 9–16+89–128, pls. 5, figs. 8; 3, pp. 17–24+129–168, pls. 5, figs. 5*).—Volume 1 of this work, of which the first three parts are here noted, is devoted to the Chiroptera, or flying mammals, the genera Nyctalus, Pipistrellus, Vespertilio, and Myotis being here taken up.

South African moles, T. F. DREYER (*Agr. Jour. Cape Good Hope, 37 (1910), No. 6, pp. 695–698, pl. 1*).—A brief account of the species that occur in South Africa is given.

A history of birds, W. P. PYCRAFT (*London, [1910], pp. XXX+458, pls. 34, figs. 50*).—As stated by the author the aim in writing this book is to present a study of bird life from the viewpoint of the evolutionist and to set forth in broad outline the evidence now generally regarded as bearing on the birth and growth of the various types of birds.

The birds of Australia, G. M. MATHEWS (*London, 1910, vol. 1, pt. 1, pp. 96, pls. 19; rev. in Auk, 28 (1911), No. 1, pp. 135, 136*).—This first part of volume 1 contains the Casuariiformes (5 species), the Galliformes (9 species), and the Turniciformes (7 species), each illustrated.

Economic ornithology in recent entomological publications, W. L. M[CATEE] (*Auk, 28 (1911), No. 2, pp. 282–287*).—In the course of this review the author presents a revised list of the bird enemies of the gipsy and browntail moths, 46 species being recorded as destroying the former and 31 the latter. It is also stated that the Biological Survey records show the killdeer (*Oxyechus vocifcrus*) and cliff swallow (*Petrochelidon lunifrons*) to be enemies of the hop flea beetle.

Notes on the fruit-eating habits of the sage thrasher in the Yakima Valley, C. H. KENNEDY (*Auk, 28 (1911), No. 2, pp. 225–228, figs. 3*).—This is an account of injury by *Oreoscoptes montanus* to raspberries, blackberries, and grapes.

The actual loss in weight of grapes through bird damage to 140 vines of Campbell Early on one ranch was 25 per cent, and the loss in profits was not less than 50 per cent because of the large item of labor in trimming the damaged clusters and the loss in fancy value through the unattractive appearance of the trimmed bunches.

Ten stomachs that were examined all showed that grapes had been eaten. At no time were green and yellowish varieties injured, the thrasher preferring a grape with the two characteristics, a dark color and sourness. It is said that the thrashers were assisted to some extent in their depredations on the early grapes by Bullock's orioles. After the thrashers had left for the South, robins, while flocking preparatory to migrating, injured the very late grapes.

A comparative study of methods of examining feces for evidences of parasitism, M. C. HALL (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 135, pp. 36, fig. 1*).—In this bulletin the author describes and discusses the various methods of examining feces to determine the presence or absence of parasites in the alimentary tract that are in use by medical and zoological investigators. He critically compares these methods with the method here proposed, which "consists in breaking up the feces very thoroughly by shaking in water, adding a quantity of small shot if necessary or desirable; sieving through a set of brass sieves and then through a silk bolting-cloth sieve or a sieve made with a jeweler's fine meshed brass screen, examining the material left on the sieve for parasites; sedimenting (and washing); centrifuging (and washing)—one tube being filled with calcium chlorid solution of 1.250 specific gravity, centrifuged, and if desired the top cubic centimeter removed with a pipette, shaken up in a tube with 14 cc. of water and centrifuged—and then making a microscopic examination of a drop of sediment from the bottom of the tube centrifuged with water, and one from the top when the calcium chlorid solution alone was used or from the bottom in case water was added to the top cubic centimeter. The material is washed at either or both of the points indicated."

The author considers this method to be the best for routine examination of various kinds of feces, it serving very well for the feces of man and for the carnivora, herbivora, and birds, not only in examining feces for worm parasites but also for coccidia. It has the advantage of speed and certainty over the smear method or sedimentation methods.

A bibliography of 26 titles relating to the subject accompanies the account.

[A note on the viability of nematode eggs and larvæ], B. H. Ransom (*Abs. in Science, n. ser., 33 (1911), No. 850, p. 592*).—Attention is called to the fact that *Nematodirus filicollis* develops to the ensheathed stage before hatching, a period of about a month being required for the development at a temperature of about 70° F., whereas under similar conditions the stomach worm (*Hæmonchus contortus*) hatches in about 2 days and does not develop to the ensheathed stage until after hatching.

A temperature of 12° was found to kill eggs of the stomach worm (*H. contortus*) in 7 to 10 days, while eggs of Nematodirus were viable after 8 weeks' exposure to the same temperature. At 32 to 40° eggs of the stomach worm were still alive at the end of 8 weeks but were dead after 13 weeks.

How to control the two worst cotton pests, the boll weevil and the bollworm, P. Hayhurst (*Arkansas Sta. Circ. 4, pp. 4*).—A brief popular account emphasizing the important steps to be taken in combating these pests.

Animal enemies of the beet, K. Schlelein (*Deut. Landw. Rundschau, 1910, No. 10, p. 102; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 176*).—The larvæ of *Silpha atrata* and *Cassida nebulosa* are said to be the source of serious injury in different parts of Germany through attacking the leaves of young beets.

Some insects affecting the tobacco crop, D. B. Mackie (*Philippine Agr. Rev. [English Ed.], 3, (1910), No. 12, pp. 706–714, pls. 4*).—This is a brief popular account of the insect pests of tobacco in the Philippines. Beneficial insects and remedial measures are included in the discussion.

[Insect enemies of the plum and olive], P. Noel (*Bul. Lab. Régional Ent. Agr. [Rouen], 1910, No. 4, pp. 16*).—Annotated lists of 254 insects and acarid enemies of the plum and 40 of the olive are presented.

Notes on some Thysanoptera, R. S. Bagnall (*Ann. Soc. Ent. Belg., 54 (1911), pp. 461–464*).—The author has determined through a comparison of Nearctic specimens with specimens collected in Great Britain, Belgium, Norway, and Denmark, that the North American grass thrips (*Anaphothrips striatus*) is the same as the old European form *A. obscurus*. Thus *striatus* becomes a synonym of *obscurus*. The type specimen of *Anthothrips* (*Aptinothrips*) *fasciatus* is redescribed and notes are presented on other species.

Papers on deciduous fruit insects and insecticides.—Spraying experiments against the grape leafhopper in the Lake Erie Valley, F. Johnson (*U. S. Dept. Agr., Bur. Ent. Bul. 97, pt. 1, pp. 12, pls. 2, figs. 5*).—In the vineyards of the Lake Erie Valley serious depredations by this pest are usually confined to somewhat limited areas adjacent to rough lands and woodlots. Periodically, however, some as yet unknown conditions seem to favor its multiplication and it spreads over wide areas, causing injury amounting to many thousands of dollars. During the seasons of 1901 and 1902 many hundreds of acres of vineyards in the vicinity of Westfield, Chatauqua County, N. Y., were seriously injured by the pest, but in 1903 it disappeared to a considerable extent and serious injury was again confined to limited areas until the season of 1910. The author states that the insect is now on the increase and that during the summer of 1910 it spread through large blocks of vineyard, and toward the latter end of the summer its presence in more or less destructive numbers was evident throughout the entire grape belt.

"The adults and nymphs of the grape leafhopper feed upon the underside of the grape leaf and by sucking the juices therefrom cause it to take on a yellowish, mottled appearance which later turns brown, and where the infestation is heavy the leaves dry out and become functionless before the fruit is mature." The adult, in which stage the winter is passed, leaves its winter protection as the days become warmer in early May and commences to feed upon the new growth of almost any plant with which it comes in contact, showing some preference, however, for the foliage of bush fruits, such as wild blackberries, cultivated raspberries, and strawberries. With the unfolding of the leaves, there is a general migration back to the foliage of the grapevine, this being the only plant upon which this particular species of leafhopper is known to reproduce.

In the vineyards of the Lake Erie Valley egg laying by overwintering females does not commence until about June 1, or after the adults have been feeding upon the vines for several weeks. The eggs, which are deposited on the underside of the leaves, are tucked under the skin indiscriminately as to location. "The egg stage covers a period of about 10 days to 2 weeks. The period of egg deposition is obviously a long one, since newly emerged nymphs are present upon the foliage from the middle of June until late in October. Observations indicate, however, that the maximum deposition must occur during the last 3 weeks in June and the first week in July, since the period when there is a maximum number of nymphs upon the leaves is included in a period from the last week in June until about August 1, at which latter date many fully developed nymphs are making their final molt."

The nymphs commence to appear about the middle of June. Five molts take place, the first 4 requiring a period of 5 days for each, while between the fourth and fifth, there is a period of 12 days; thus about a month is required in which to complete the nymphal period. The widespread dissemination of this pest is thought to take place largely during the fall migration and again during the spring migration when the adults leave their winter shelter and return to the vines.

On account of the inability of the nymphs to escape from the underside of the grape leaves, and because of the soft and unprotected condition of their bodies, the nymphal period is the most vulnerable stage of the insect. In observations made during the summer of 1910, the date on which the maximum number of nymphs was found to be present on the foliage before those earliest to hatch had developed their wings and before serious injury had become apparent was July 12. At this time a small number of the nymphs earliest to hatch had entered upon their last molt and the number present upon the leaves in earlier stages of development was very large.

Applications of blackleaf tobacco extract containing 2¾ per cent nicotin at dilutions varying from 1 gal. to 75 to 200 of water killed all nymphs hit. Blackleaf "40," which contains 40 per cent nicotin, used at strengths of from 1 to 1,000 to 1 to 1,750 killed all the nymphs hit, and at a strength of 1 to 2,000 killed all but fully developed nymphs. Three acres of a vineyard at North East, Pa., was sprayed in 1 day at a cost of $7.40, $2.40 of which was expended for the blackleaf tobacco extract as applied at a dilution of 1:150, or a total expense of $2.47 per acre. A badly infested vineyard of 11 acres was sprayed July 14 to 16 with blackleaf extract 1:100 at a total cost of $3.75 per acre. On 3 blocks in which the strength of the blackleaf tobacco extract varied from 1:75, 1:100, and 1:150, so far as could be observed the 1:150 dilution was as effective as any. All of the applications mentioned were made before any of the nymphs had completed the final molt and all were highly effective in reducing the number of the nymphs to a point where their injury for the remainder of the season was very slight.

Some synonymy and other notes on Aphidiinæ, A. B. GAHAN (*Proc. Ent. Soc. Wash., 12 (1910), No. 4, pp. 179–189*).—This paper includes notes on the host relations of several parasites of this subfamily, the hosts of which have heretofore been unknown. The author also records the occurrence of 4 European species not hitherto credited to our fauna.

The use of potassium permanganate against the woolly aphis, R. AHRENS (*Geisenh. Mitt. Obst u. Gartenbau, 25 (1910), No. 11, pp. 182, 183; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 174*).—Favorable results are reported to have been obtained through the use of a 1 per cent solution of potassium permanganate.

Recent results of compounding miscible oils for use in controlling white fly, W. W. YOTHERS and S. S. CROSSMAN (*Fla. Grower, 3 (1911), No. 27, p. 7*).—The authors present 4 formulas that they find to give satisfactory results in combating the citrus white fly, viz, (1) caustic potash whale-oil soap 1½ gal., crude oil (not distillate oil) 24° Baumé 3 gal., water to emulsify about 1½ gal.; (2) caustic potash whale-oil soap 2 gal., distillate oil (gas oil) 30° Baumé 4 gal., water to emulsify about 2 gal.; (3) caustic potash whale-oil soap 2 gal., paraffin oil (diamond paraffin oil) 28° Baumé 3 gal., water 1 gal.; (4) caustic potash whale-oil soap 2 gal., paraffin oil (junior red engine oil) 25° Baumé 3 gal., water 1 gal. Each of these contains sufficient ingredients to make up 200 gal. of spray material at a cost of about 63 cts., 84 cts., $1, and $1.05, respectively.

The experimental results obtained from the use of these formulas have been summarized in the following table:

Summary of spraying experiments with miscible oil compounds.

Formula.	Oil content.	Approximate dilution.	Number of trees sprayed.	Number of insects examined.	Insects killed.	Remarks.
	Per cent.				*Per cent.*	
(1) Crude oil	1½	1:34	18	3,114	98.5	
(2) Distillate oil	2	1:25	21	5,580	99.2	
Do	2	1:25	17	869	91.4	3 pints of rosin oil added.
(3) Diamond paraffin	1½	1:33	16	665	97.6	
Do	1½	1:33	20	4,770	99.8	1 quart of rosin oil added.
Do	2	1:25	17	2,228	99.7	
(4) Junior red engine oil.	1½	1:33	22	4,802	100	

For summer use, formulas (3) and (4) should be diluted to make 300 gal., or spray material containing 1 per cent of oil.

A new scale insect, R. D. ANSTEAD (*Planters Chron., 5 (1910), No. 29, p. 372*).—The black scale (*Saissetia* [*Lecanium*] *oleæ*) is reported from India for the first time, having been found at Kotogiri on *Erythrina lithosperma* and the upper sides of the leaves of *Castilla elastica.* It is said to be rapidly spreading on coffee.

Recent work with fungus parasites of scale insects (*Agr. News* [*Barbados*], *10* (*1911*), *No. 232, p. 94*).—In this brief review it is stated that good results have followed in Barbados and Grenada from the transference of the shield scale fungus (*Cephalosporium lecanii*) to the green and mango shield scales (*Coccus viridis* and *C. mangiferæ*) on guava and mango plants, and to the mealy shield scale (*Pulvinaria pyriformis*), which occurs on Java plum (*Eugenia jambolana*) and rose apple (*E. jambos*) trees.

On the probable viviparity in some danaid, i. e., pierid butterflies, N. J. KUSNEZOV (*Trudui Russ. Ent. Obshch. S. Peterb.* (*Horæ Soc. Ent. Ross.*), *39* (*1910*), *pp. 634–651, pl. 1*).—During the course of anatomical studies of the Danaidæ, the author found "fully developed larvæ lying in a uterus-like widening of the lower portion of the oviductus communis. . . .

"In all cases these larvæ are bent twofold on the seventh body segment and directed with their heads toward the ostium of the ductus seminalis. This situation of the intrauterine larvæ was the same and quite uniform in all my preparations. No chorion was observed which in danaids is known as a complex and variously ribbed structure. This seeming absence of the chorion may also be considered as an indirect indication of the real viviparity, for this structure could not be destroyed by the method of preparing or absorbed during the short period after the death (post-mortem) of the mother insect."

Nearly all of the species of danaids of the Palearctic region were examined, a list of 30 forms being given in which these intrauterine larvæ were found. Attention is called to the fact that in this list the forms of the genus Colias prevail, especially those characteristic to high northern latitudes or to Alpine altitudes in mountainous countries. Only 2 species of Lepidoptera have previously been recorded as viviparous, namely, *Tinea vivipara* in Australia and an undetermined tineid species in South America.

An outbreak of destructive caterpillars in Batangas rice fields, D. B. MACKIE (*Philippine Agr. Rev.* [*English Ed.*], *3* (*1910*), *No. 12, pp. 703–705*).—The author reports that in the month of May enormous numbers of caterpillars appeared in Batangas rice fields and destroyed the greater part of the rice crop in the invaded section. *Spodoptera maurita* is thought to be the species concerned. A large percentage of the rice in certain districts of the Iloilo Province was also destroyed, apparently by the same pest.

Notes on the geometrid Gypsochroa sitellata, H. M. RUSSELL (*Proc. Ent. Soc. Wash., 12* (*1910*), *No. 4, pp. 177, 178*).—Biological and descriptive notes are given on *G. sitellata,* which the author reports to have occurred in abundance on pokeweed at Dade City and Orlando, Fla., in the fall of 1907.

Papers on deciduous fruit insects and insecticides.—Life history of the codling moth and its control on pears in California, S. W. FOSTER (*U. S. Dept. Agr., Bur. Ent. Bul. 97, pt. 2, pp. 13–51, pl. 1, figs. 10*).—In this paper the author reports life history studies and spraying experiments conducted in the vicinity of Walnut Creek, Cal., during the seasons of 1909 and 1910.

Because of a mean lower temperature in California during the development of the codling moth, there is an increase in the period required for the growth of its respective stages over that observed in the East, especially for the first of the 2 practically full broods of larvæ that develop in the pear-growing districts of the interior counties of the State. The second brood, however, is by far the most destructive of the two, both by reason of its numbers and because of the stage of the fruit when it appears.

In 1909 the first pupa was found on March 11. Four of 300 larvæ collected from banded trees during February, 1910, had pupated by March 12. Of the 118 which produced adults in the spring, 95 had pupated by March 31 and all had pupated by April 10. The time spent in the pupal stage is said to vary considerably for different individuals, but all of this brood in 1909 required a month or more, the average time being 39.54 days. It is thought probable that in 1909 the first adult appeared about March 23, as on this date an apparently freshly-shed pupal skin was found and another was discovered in the field on March 27, at which time Bartlett pears were just about in full bloom. In the spring of 1910, moths were seen in the orchard April 9, although none emerged at the laboratory until April 14. The period of emergence of moths is said to last about 2 months.

In 1909 no eggs were laid in the breeding cages until May 7, although many were found in the orchard on May 5. Since practically all moths in the field had emerged by May 6, it is thought improbable that any eggs were deposited in the field after May 15. In 1910 several eggs were found on foliage in the field April 25 at Walnut Creek and on May 2 eggs were numerous throughout the Valley.

One noticeable difference between the life history of the codling moth in California and in the country east of the Rocky Mountains is the increased length of time required for incubation of the first-brood eggs, due to the fact that as a rule there is considerable cool weather, especially at night, during the months of April and May. In the vicinity of Walnut Creek in 1909, the time required for incubation varied from 17 to 22 days, averaging 20.05 days for the individuals under observation. A limited number of observations in 1910 indicated that the incubation period varied from a minimum of 15 to a maximum of over 30 days, the majority requiring about 25 days.

The first larva under observation in 1909 hatched out May 7 from eggs collected in the field. On May 11, 1909, a number of recently hatched larvæ were found in the orchard, while on May 11, 1910, young larvæ were quite numerous in the field. Of the larvæ hatching under observation in 1909, only 29 reached full development in the fruit, from 25 to 42 days being required. "The first larva to leave the fruit in the field was not observed, but on June 5, 3 newly-formed pupæ and 20 full-grown larvæ were found under bands on 21 pear trees, and 4 pupæ and 28 full-grown larvæ were found under bands on 10 apple trees. The time from leaving fruit to pupation for this brood, averaging 7¼ days, would indicate that the first full-grown larvæ left fruit in late May. Band records and data obtained by bringing in quantities of wormy fruit picked from trees in May showed a maximum number of first-brood larvæ leaving fruit June 14 to 26. However, later-maturing larvæ of this brood left fruit as late as July 21. In the summer of 1910 many full-grown larvæ had left the fruit prior to June 1. At Walnut Creek on June 1, 4 pupæ and 248 larvæ were taken from the bands on 11 apple trees, and at Suisun on June 8, 10 pupæ and 45 larvæ were taken from bands on 15 pear trees. The time spent from leaving fruit to pupating varied from 3 to 23 days, with an average of 7¼ days. . . . The first pupæ were found in the field June 5, 1909, when a total of 7 were taken with 49 larvæ under bands from 21 pear and 10 apple trees. In 1910 pupæ were found June 1 and were plentiful in the vicinity of Suisun and Walnut Creek by June 5. . . . Records kept out-of-doors for 165 individuals gave a minimum of 10 days and a maximum of 27 days with an average of 16¼ days for the time spent in the pupal stage. . . . The total time from leaving fruit to emergence of adults varied from 20 to 47 days, averaging 25.69 days for the individuals under observation. . . . Moths began to emerge June 17 from larvæ and pupæ collected under bands June 5, reaching a maximum emergence some 2 weeks later, July 4 to 15. . . . From the earliest appearing eggs in spring, about April 15, to the first appearing moths, June 17, gives some 63 days as the approximate length of the life cycle of the first generation. The laboratory records for individuals kept in breeding cages give a life cycle of 71 to 78 days."

In 1909 the second-brood eggs were first found on July 7 at which time 5 larvæ that had just hatched, none of which had entered the fruit, were discovered. In rearing cages eggs were deposited in large numbers from July 8 to 10. The time required for incubation was less than half that required for the first-brood eggs. In cages it varied from 7¼ to 9½ and averaged 8¼ days. The first larvæ to hatch out in the laboratory did so on July 12. The first picking of pears in the orchard where the spraying experiment was carried out in 1909 began July 15 and lasted 5 days, during which time young larvæ were hatching and entering the fruit in numbers in the unsprayed block so that even the earliest first picking of fruit did not wholly escape the second-brood larvæ. In 1910 many second-brood larvæ were in the fruit before the first picking.

An average of about 26 days was found to be required for the development of larvæ in sound or nearly sound fruit out-of-doors at the laboratory in 1909. "The first larvæ not pupating but going into winter cocoons in 1909 were taken from bands July 17. Of 78 larvæ taken on this date, 38 pupated and adults emerged, 28 died, and 20 went through the winter as larvæ. Of 196 larvæ and pupæ collected under bands on June 28, 1910, 5 did not pupate but wintered as larvæ in cocoons." In 1909 the maximum number of larvæ and pupæ was collected on June 26, while in 1910 the greatest number was found nearly 2 weeks earlier, on June 14. Tables giving the band records and emergence of moths for Walnut Creek and Suisun sections show the maximum emergence of moths to be about 3 weeks earlier than the maximum emergence at San José.

No parasites were reared during the course of the work, but an occasional carabid larva was found under the bands eating the larvæ and late in the season a number of tenebrionid beetles (*Eulabis rufipes*) were found under the bands with partly eaten larvæ, although in no case were these beetles actually found eating the larvæ. The effect of sprays on the places of entrance into pears by larvæ and commercial results from spraying are reported in detail. All of the plats receiving the first spraying (soon after the falling of the petals) showed a comparatively light infestation at the calyx, and those receiving the two early sprayings had very few pears wormy at the calyx. Those plats on which the first spraying was omitted had a greater percentage of pears wormy at calyx, although they received one thorough spraying just before the first-brood worms began to enter the fruit.

The author finds that as the first-brood larvæ begin entering the fruit about a month after most of the petals have fallen, though this time may vary somewhat with the season, all spraying for the first brood should be completed within 3 to 4 weeks after the blossoms are off the trees. Two applications for this brood reduced the worms for the season from 9.62 to 18 per cent lower than the plats sprayed once. Two, and preferably 3, treatments are advised, using arsenate of lead at the rate of 4 lbs. to each 100 gal. of water. The first application should be made as soon as most of the petals have fallen; especial pains should be taken to fill as nearly as possible each calyx cup with the poison, and the trees should be drenched. The second treatment should come 3 to 5 weeks after the falling of the petals. The third application should be given 9 or 10 weeks after the falling of the blossoms, or about 2 weeks before the first picking begins. If only 2 treatments are possible, the first and second should be given.

Notes on the life history of the larch case bearer (Coleophora laricella), G. W. HERRICK (*Ann. Ent. Soc. Amer., 4 (1911), No. 1, pp. 68–70*).—This insect is an European species which is gradually becoming widely distributed in the northeastern United States and parts of Canada, causing considerable injury to larch trees wherever present. It devours the small, green leaves in early spring as fast as they push out, on many trees the green tissues being eaten out and the leaves left pale and bleached.

Observations indicate that the larvæ molt just before leaving their winter quarters on the branches. They were found active and feeding on April 16, 1910, at Ithaca, N. Y. The first pupa was found in the breeding cages on April 26, the period of pupation lasting from 2 to 3 weeks. In the insectary the first moths emerged on May 11; they began pairing a few days after emergence and on May 31 eggs were found deposited on leaves in the breeding jars. On June 10 the author found eggs in the field in abundance, apparently being placed indiscriminately on either side of the leaves. "Investigation shows that the larva bores through the base of the eggshell and goes directly through the epidermis into the leaf beneath the egg. Here the larvæ live, mining in the tissues of the leaf, but growing very slowly. The excrement of the tiny larva is packed behind it in the mine. Here the larvæ live until September. . . . The larvæ now feed on the leaves of the larches until the latter part of October when they migrate to the branches and go into hibernation."

Summary of food habits of American gall midges, E. P. FELT (*Ann. Ent. Soc. Amer., 4 (1911), No. 1, pp. 55–62*).—A brief summary of the food habits of the Itonidæ, better known as the Cecidomyiidæ.

Two rare leaf enemies of fruit trees, G. KORFF (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 8 (1910), No. 9, pp. 101–104, figs. 2*).—An account of injury caused by the pear-leaf gall midge *Perrisia* (*Cecidomyia*) *pyri* to the pear at Herrenberg and the leaf-vein gall midge *Diplosis* (*Putoniella*) *marsupialis* to the plum at Erlangen, Germany.

A new chironomid miner, V. WILLEM (*Acad. Roy. Belg. Bul. Cl. Sci., 1910, No. 1, pp. 33–36*).—The larva of a new species of Cricotopus is said to be found in great numbers on the river Lys, near Ghent in Belgium, where they mine the upper surface of the leaves of the fringed water lily (*Limnanthemum nymphoides*).

Some facts indicating that malaria may be spread through other agencies than the anopheles mosquito, J. CHICO (*Amer. Jour. Pub. Hyg., 20 (1910), No. 3, pp. 561–565*).—The author here presents the evidence which leads him to think that "the anopheles is not the only vehicle for the spread of malarial diseases."

Researches on the development of the ox warble (Hypoderma bovis), C. VANEY (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 5, pp. 283–286*).—The author states that in the Lyonnais region, where most of the cattle slaughtered in the summer are of the Charolais breed, the percentage infested by the ox warble varies from 18 to 21.

Notwithstanding that a very careful search was made from September to December in abattoirs at Lyons, the author did not succeed in finding the small larvæ either in the dermis or in the subcutaneous tissue of animals examined at slaughter. During the examinations, however, larvæ were found in the esophagus and in the beginning of the rumen. Frequently the larvæ were very numerous, as many as 22 being found in the same esophagus. The specimens collected were variable in size, their length varying from 4 to 14 mm. The author considers the great difference in the size of the larvæ to be sufficient evidence that they pass the first stage of their development in the submucosa of the anterior region of the digestive tube of their host. This exclusive localization of the young larvæ in the esophagus and their absence at the same time from the skin is considered sufficient proof that their entrance is only by way of the digestive tract.

Biological studies on the glossines of central Dahomey, E. Roubaud (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 7, pp. 406–409*).—*Glossina palpalis*, *G. tachinoïdes*, and *G. longipalpis* are the species which the author has studied.

Experiments on transmission of bacteria by flies, with special relation to an epidemic of bacillary dysentery at the Worcester State Hospital, Massachusetts, 1910, S. T. Orton and W. L. Dodd (*Boston Med. and Surg. Jour., 163 (1910), No. 23, pp. 863–868, fig. 1*).—In investigations made during the course of an epidemic of bacillary dysentery, *Bacillus prodigiosus* planted in the hospital laundry was recovered from flies caught in traps in the scullery and 5 screened ward dining rooms at an interval of from 2 to 6 days after the original plant.

In examinations made for the breeding places of the fly on the hospital grounds a prolific source was found in piles of spent hops and barley malt, brewery waste which had been hauled in for use as a fertilizer. One oz. from the richest portion of such a pile yielded 1,018 maggots. Piles of pig manure mixed with straw bedding, etc., kept outside the piggery building and exposed to the air and rain were also found to be badly infested.

The rôle of insects as agents in the propagation of ergot of the Gramineæ, L. Mercier (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 8, pp. 300–302*).—The author finds that the conidia of ergot (*Claviceps* sp.) on rye grass (*Lolium perenne*) are conveyed on the hair and in the alimentary canal of a fly (*Sciara thomæ*). It is stated that in the vicinity of Nancy, France, where the observations were made, this fly is very common and is always found on *L. perenne*.

Concerning the trypanosome in Myoxus nitela and the flea which appears to propagate it, A. Laveran and A. Pettit (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 20, pp. 950–952*).—The evidence presented indicates that *Trypanosoma blanchardi* which occurs in *M. nitela* is transmitted by means of the flea described by Rothschild as *Ceratophyllus laverani* n. sp.

The rat flea as the intermediate host of a rat tapeworm, W. Nicoll (*Brit. Med. Jour., 1911, No. 2620, p. 621*).—The cysticercoid stage of *Hymenolepis diminuta*, one of the most common tapeworms of the rat and an occasional parasite of man, was found by the author in about 4 per cent of the rat fleas (*Ceratophyllus fasciatus*) dissected.

A single specimen is usually found in each flea although 3 were found in one instance. This same cysticercoid is stated to have been found by Grassi and Rovelli in 4 different insects. "Only 2 instances are yet known of fleas serving as the intermediate hosts of tapeworms. The first of these is the well-known *Dipylidium caninum*, the larval stage of which is passed in the dog flea and the human flea. The other has been described quite recently by Dampf [E. S. R., 24 p. 758] from the flea *Mesopsylla eucta*, which is parasitic on the jerboa (*Alactaga (Dipus) jaculus*)."

A catalogue of the Coleoptera (*Coleopterorum Catalogus. Berlin, 1910, pts. 16, pp. 36; 17, pp. 68; 18, pp. 35; 19, pp. 86; 20, pp. 111; 21, pp. 42; 22, pp. 167–354; 23, pp. 174; 24, pp. 137; 1911, pts. 25, pp. 18; 26, pp. 27; 27, pp. 222*).—In continuation of this work (E. S. R., 23, p. 464) part 16, by P. Pape, takes up the Brachyceridæ; part 17, by Zaitzev, the Dryopidæ, Cyathoceridæ, Georyssidæ, and Heteroceridæ; part 18, by E. Csiki, the Platypsyllidæ, Orthoperidæ, Phænocephalidæ, Discolomidæ, and Sphæriidæ; part 19, by M. Bernhauer and

K. Schubert, the Staphylinidæ; part 20, by A. Schmidt, the Aphodiinæ; part 21, by K. Ahlwarth, the Gyrinidæ; part 22, by H. Gebien, the Tenebrionidæ, II; part 23, by S. Schenkling, the Cleridæ; part 24, by H. Bickhardt, the Histeridæ; part 25, by K. W. von Dalla Torre, the Cebrionidæ; part 26, by M. Pic, the Scraptiidæ and Pedilidæ; and part 27, by A. Raffray, the Pselaphidæ.

Further biological notes on the Colorado potato beetle, Leptinotarsa 10-lineata, including observations on the number of generations and length of the period of oviposition.—II, Illinois, A. A. GIRAULT and J. ZETEK (*Ann. Ent. Soc. Amer., 4 (1911), No. 1, pp. 71–83*).—A continuation of the studies previously noted (E. S. R., 20, p. 1151).

The elm-leaf beetle, G. W. HERRICK (*New York Cornell Sta. Circ. 8, pp. 6, figs. 9*).—A brief popular account including methods of control.

Budworms in corn (Diabrotica 12-punctata), W. F. TURNER (*Alabama Col. Sta. Circ. 8, pp. 7, fig. 1*).—A popular account of the southern corn root worm, which next to the corn weevil is the worst pest of the corn crop in Alabama.

The application of cold to the destruction of tobacco beetles, G. POOK (*Abs. in Chem. Ztg., 34 (1910), No. 126, p. 1127; Internat. Inst. Agr. [Rome], Bul. Bur. Intel. and Plant Diseases, 1910, Nov., p. 177*).—Very successful results are said to follow the application of cold in the destruction of tobacco beetles, this practice being commonly employed in Brazil. The tobacco is exposed for about 22 days in absolutely dry inclosures to a temperature of from —3 to —4° C. or preferably to —10°. The immature stages as well as the adults are killed at these temperatures.

The boll weevil advance in Alabama, W. E. HINDS (*Alabama Col. Sta. Circ. 5, pp. 6*).—It is stated that the boll weevil was on September 3, 1910, found for the first time in Alabama, on the western edge of Mobile County. Its advance was so rapid that by the middle of September the line of infestation included about three-fourths of the county and 10 days later weevils were found in the southern part of Choctaw County. The author considered it probable that by the time of the first frost, they would have reached as far north as the southern part of Pickens County and as far east as Covington County.

The biology of the weevil is briefly summarized and attention called to the importance of the immediate adoption and practice of control measures.

Papers on cereal and forage insects.—The maize billbug (Sphenophorus maidis, E. O. G. KELLY (*U. S. Dept. Agr., Bur. Ent. Bul. 95, pt. 2, pp. 11–22, pls. 2, figs. 6*).—In this paper the author reports observations made from June to December, 1910.

This beetle, formerly referred to as *S. robustus*, was found by Chittenden in 1905 to represent a new species which he described as *S. maidis*. It appears to occur in the entire territory between South Carolina and Texas and northward to Kansas and Missouri, its injury having been reported from South Carolina, Georgia, Alabama, Arkansas, and Kansas: it has also been recorded as occurring in Michigan. Technical descriptions are presented of the larva and pupa, by E. A. Schwarz, with the original description of the adult by Chittenden.

The adults attack young corn plants and probably some of the coarser grasses, as the adults have been found at the base of swamp grass (*Tripsacum dactyloides*) in considerable numbers, together with larvæ and pupæ. In the latitude of southern Kansas eggs were laid in slits in the sheath of the plant during the month of June, the larvæ hatching out in from 7 to 12 days. They at once begin feeding on the tissues of the young corn at the bottom of the egg puncture, directing their burrowing inward and downward into the taproot. When they finish eating the tender parts of the taproot they direct their feeding upward and continue until full grown. This burrowing of the taproot of the young growing corn plant is disastrous to the root system; the roots, first dying at the tips, soon become of little use to the plant, allowing it to die or to become more or less dwarfed. Eggs are often deposited in plants of even less than one-half inch in diameter. The larvæ on hatching burrow into the heart of the plant and cut off the growing bud, thus killing the top; they then direct the burrowing downward only to devour the stub, leaving themselves without food and thus perish. "Plants of more than one-half inch diameter which become infested with larvæ make very poor growth, being very slender, rarely reaching a height of more than 2 or 3 ft. before tasseling, and do not produce shoots or ears. Those that do not become infested until they are half grown may produce small ears." Sometimes there are 3 or 4 larvæ in the same plant, their burrows often running into each other. In badly infested fields 2 larvæ occur quite often in the same plant, although 1 is the usual number and is sufficient to ruin the plant.

"The length of the larval life ranges from 40 to 50 days, as indicated by laboratory observations and checked by collections in the field. They begin maturing and pupating by August 1, pupation reaching the maximum by August 20, and with the exception of a few stragglers all are mature and changed to pupæ by September 1. The larvæ, on finishing their growth, descend to the lower part of the burrow, to the crown of the taproot, cutting the pith of the cornstalk into fine shreds with which they construct a cell where they inclose themselves for pupation. . . . The pupæ occur mostly during the latter part of August and first part of September and are always to be found in their cells in the larval burrows near the crown of the taproot and nearly always below the surface. The pupal period is from 10 to 12 days. . . . The adults begin to issue about the middle of August and continue to do so until the middle of September. Some of them leave the pupal cell, but most of them remain there for hibernation." The adults which hibernate in the pupal cells issue in late spring about the time young corn is sprouting. They kill the small plants outright and injure the larger ones beyond recovery. Females issuing from hibernation commence to oviposit after a few days feeding on young corn. There is only one generation a year.

The pulling up and burning of the stubble is thought to be the most practical means of dealing with the pest and at the same time destroys the lesser cornstalk borer (*Diatræa saccharalis*). Care must be taken in pulling up infested stalks that they do not break off above the beetle, leaving the pest in the ground. As the infested stalks have a very poor root system, they are easily pulled. Spraying young cornstalks with arsenical fluids at the time the beetles are making their attacks is stated to be very laborious and not very effective.

The alfalfa weevil (Phytonomus murinus), F. M. WEBSTER (*U. S. Dept. Agr., Bur. Ent. Circ. 137, pp. 9, figs. 10*).—This circular, presenting a brief descriptive account of the alfalfa weevil and the injury it causes, has been prepared chiefly for the purpose of reaching alfalfa growers and obtaining information as to the appearance of the pest in new localities.

It is thought that in dealing with this pest the work of the Bureau of Entomology should be, first, to endeavor to restrict the pest as effectually and as long as possible to its present area of infestation, and, second, to use every means in its power to control it, in the meantime, within this area. Quarantine between the different States is considered wholly useless on account of the agency of the railroads and winds as factors in the dispersion of the beetles. "The most inexpensive and practical means of controlling introductions of the pest by railroads appears to be in the close surveillance of the railroad right of way and the stamping out of incipient outbreaks as soon as discovered."

Diseased bees and combs infected with a minute pathogenic protozoal parasite, apparently the same as Nosema apis found by Zander and Doflein in diseased bees in Bavaria, H. B. FANTHAM and ANNIE PORTER (*Abs. in Nature [London], 86 (1911), No. 2163, pp. 234, 235*).—The infected combs used in the study here reported were obtained from Cambridgeshire and Hertfordshire in March. Since infected bee larvæ were found it is thought quite probable that this parasite is capable of hereditary infection as is the case with *N. bombycis.*

A new proctotrypid parasite of the larva of Anthrenus musæorum, E. TRANI (*Atti R. Ist. Incoragg. Napoli, 6. ser., 61 (1909), pp. 19–24, pl. 1*).—This new parasite is described as *Lælius anthrenivorus.*

Note on a parasite of the black scale of the olive, J. RUBY (*Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), No. 2, pp. 181, 182*).—A brief account of *Scutellista cyanea* as a parasite of *Saissetia* (*Lecanium*) *oleæ* in France.

Transmission of spotted fever by other than Montana and Idaho ticks, MARIA B. MAVER (*Jour. Infect. Diseases, 8 (1911), No. 3, pp. 322–326*).—In the author's experiments Rocky Mountain spotted fever was transmitted to normal guinea pigs by nymphs of *Dermacentor marginatus* (from Utah) and *Amblyomma americanum* that in the larval stage had engorged on infected ones, also by nymphs and adults of *D. variabilis* (from Massachusetts) that had engorged as larvæ and nymphs, respectively, on infected guinea pigs.

Transmission of spotted fever by the tick in nature, MARIA B. MAVER (*Jour. Infect. Diseases, 8 (1911), No. 3, pp. 327–329*).—"Six hundred and fifty-six ticks were collected during the spring months of 1909; 254 of the species *Dermacentor modestus* and 402 *D. venustus*, for the purpose of studying the infectivity of the tick in nature. These ticks were found on cows, bushes, and vegetation in the Lo Lo Valley and Owl Canyon, Mont., and in the vicinity of Pocatello, Idaho. Fourteen groups were arranged, consisting of 25 male and 25 female ticks each. Each group was placed in a new tick-proof sack, with a selected guinea pig of medium size; 9 sacks of Montana ticks (*D. venustus*) and 5 sacks of Idaho ticks (*D. modestus*) were arranged in this way."

In 2 of the groups the guinea pig became infected, the ticks of both having been collected from cows in the Lo Lo Valley.

A contribution to the study of Trypanosoma hippicum, A. LAVERAN (*Bul. Soc. Path. Exot., 4 (1911), No. 3, pp. 168–175*).—Inoculation experiments made by the author show that *T. hippicum* can not be identified with *T. evansi.* He thinks it probable that *T. hippicum* is the same as the form reported by R. Rangel[a] to be the cause of desrengadera in Venezuela, since their morphology and pathogenicity are quite similar. See also a note by Darling (E. S. R., 23, p. 486).

FOODS—HUMAN NUTRITION

Shellfish contamination from sewage-polluted waters and from other sources, G. W. STILES (*U. S. Dept. Agr., Bur. Chem. Bul. 136, pp. 53, figs. 15*).—The data reported are based on extended investigations and inspection work carried on in many localities and bacteriological work undertaken to supplement such studies. Existing conditions are in many cases criticized but it is stated that the report "is in no sense intended to discredit the valuable industries concerned, but rather to point the way in which the products of these industries may be accepted with greater confidence by the public."

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[a] Lab. Hosp. Vargas [Caracas] Bol. 2, 1905, pp. 11–39, pls. 2; abs. in Bul. Soc. Path. Exot., 3 (1910), No. 6, pp. 380, 381.

Sources of contamination and similar questions are discussed and the results of cooking tests on the bacteriological content of shellfish are reported. The bulletin contains a digest of data on sewage contamination and an extended bibliography.

Quotations from the author's summary follow:

"There is undisputed evidence to show that shellfish become contaminated when placed in sewage-polluted water, and that *Bacillus coli* and *B. typhosus* will survive for variable lengths of time in the liquor and the body contents of such shellfish after their removal from infected water.

"The presence of sewage organisms in oysters and other shellfish, even in small numbers, may be indicative of great danger; for, where such organisms exist, the specific cause of enteric fever and allied disorders may also be found. . . .

"The indiscriminate introduction of sewage into our natural bodies of water is now the greatest enemy to the shellfish industries. In order to correct this evil it will be necessary to prevent further pollution of our waters, or else to remove the shellfish industries from the grounds subject to pollution.

"Oyster beds should be protected from every possible source of contamination, and they should be located in water proven to be pure by repeated examinations. . . .

"The practice of floating oysters in water of questionable purity should be absolutely prohibited because of the probability of sewage contamination. When it is desired to remove the gross filth from the exterior of the shell, oysters may be floated and allowed 'to cleanse themselves' in suitably constructed devices in waters free from pollution, and containing no less salt than the water in which they will grow to maturity.

"Like other perishable food products, oysters may become unfit for use if stored or kept under insanitary conditions. This spoilage, however, may take place wholly from the length of time out of water.

"Oysters removed from pure beds may become contaminated during the process of shucking or preparation for the market in insanitary shucking establishments. . . .

"The liquor in the shell surrounding the oysters contains more bacteria than does an equal volume of meat from the same oyster. This liquor, together with any sand in the gills of the oyster, can be removed and the meat chilled at the same time by the use of pure ice and water. This washing process can be done efficiently within 3 to 10 minutes, depending upon the method employed. Oysters should not be allowed to soak in fresh water, as they increase in volume, change in appearance and flavor, and decompose more rapidly than those not soaked.

"[As shown by cooking tests], steaming contaminated oysters and clams in the shell, or cooking them after shucking for 15 minutes at boiling temperature, practically destroys all organisms of a questionable character, but since in practice shellfish are never cooked for this length of time, cooking can not be depended upon to remove this danger.

"Oysters intended to be eaten on the half shell, above all others, should be produced from beds of unquestionable purity, and they should be consumed preferably while fresh from the beds; although if properly kept at cool temperatures under sanitary surroundings shell oysters may remain wholesome and in good condition for several weeks after dredging.

"The investigations show that vast areas of valuable shellfish grounds in this country are now reasonably free from sewage pollution, but this territory will gradually diminish in size if sewage is not properly cared for in the future. Comparatively speaking, only a small acreage is now subject to serious pollution."

The food of the oyster and the mechanism of its contamination by polluted water, FABRE-DOMERGUE (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 19, pp. 829–831*).—A contribution to the question of shellfish pollution.

Sea mussels and dogfish as food, I. A. FIELD (*U. S. Dept. Com. and Labor, Bur. Fisheries Bul., 28 (1908), pt. 1, pp. 243–257; Doc. 655, 1910, pp. 243–257*).—From numerous tests carried on by the author the conclusion is reached that the common sea mussel (*Mytilus edulis*) is nutritious, palatable, and easily digested. "It contains only half as much waste as the oyster, is more abundant, is more easily cultivated in that it requires less special conditions for growth, and it is adapted for making a greater variety of food preparations. Furthermore, it is in season for the table when the oyster is out of season." Information is given regarding the cultivation of the sea mussel in Europe.

From tests of culinary qualities, made under a variety of conditions, of the smooth and the horned dogfish, he concludes that the flesh of these fishes is cheap, palatable, nutritious, and easily preserved, and he believes further that it is as digestible as that of other fishes.

"The packing of both mussels and dogfish ought to become a large industry. Conditions are good for creating a market for them. They are a cheap, wholesome food for the masses and constitute a field of opportunity for the fisherman, the packer, and the merchant."

The paper is followed by a discussion. See also a note by Field (E. S. R., 19, p. 1061).

Studies of fish sausage, L. BITTER (*Hyg. Rundschau, 21 (1911), No. 4, pp. 181–189*).—Fish sausage is a commercial product, and, according to the author, reasonable in price in comparison with similar goods. Its food properties were studied.

As shown by the results of analysis, the samples contained on an average water 66.64, protein 21.9, fat 9.33, and ash 2.01 per cent.

According to the author, fish sausage is a palatable and useful foodstuff. He states that it should be cooked in boiling water for 25 minutes before it is served.

Studies of poisoning due to canned fish, G. TEYXEIRA (*Staz. Sper. Agr. Ital., 43 (1910), No. 7–9, pp. 646–655*).—A contribution to the question of the examination of food products for ptomaines.

The influence of common salt on the bacteria which cause meat poisoning, S. SERKOWSKI and P. TOMCZAK (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 4, pp. 211–216*).—The experiments reported led to the conclusion that from 5 to 10 per cent of salt was not germicidal to the bacteria under consideration. A higher concentration had a retarding effect on ripe colonies, while a 15 to 20 per cent solution hindered the development of *Bacillus enteritidis* or Proteus varieties. A further conclusion is that salting meat and other preserved foods has prophylactic value when salt is used with sterile materials and when the concentration of the solution is greater than 15 per cent.

Russian process of preserving meat, S. L'H. SLOCUM (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 83, pp. 138, 139*).—A process of preserving meat, devised by M. Vlasevich, is described, which, it is stated, costs about 2½ cts. per carcass. It consists in forming on the surface of the meat a thin elastic coating strongly acid in reaction.

In carrying out the process the carcass, with the viscera and head removed, and either with or without the skin, is dipped for a few seconds in a tank filled with a 15 to 20 per cent solution of acetic acid and then hung in the air and dried for 2 or 3 hours. If without the skin, it is then dipped in a solution of gelatin saturated with a 15 per cent solution of common salt. If the carcass is treated with the skin on, only the parts which are exposed are covered with the gelatin solution. The neck is seared with a hot iron and covered with salt, and the openings of the large blood vessels are packed with cotton soaked in 80 per cent solution of acetic acid. The treated carcasses are covered with bags to prevent injury from flies.

It is claimed that meat thus treated and stored from 14 to 16 days in summer does not lose its good qualities. The author states that in his experience meat so preserved was palatable after 6 weeks' storage.

The weight of the edible organs and interior fat of animals slaughtered as food—a contribution to the statistics of meat consumption, E. GRAMS (*Das Gewicht der als "Fleisch" verwertbaren Organteile und des Eingeweidefettes der schlachtbaren Haustiere; ein Beitrag zur Berechnung des Fleischkonsums. Inaug. Diss., Univ. Bern, 1910, pp. 84*).—The author considers that in general the statistics of meat consumption are not accurate, since they are based upon slaughter weights rather than upon the actual amounts of edible material in the carcass. Accordingly, he studied the proportion of edible organs and internal fat in different farm animals used as food.

According to his summary, the amount of such material per 100 kg. gross weight of meat in the case of bulls is 19.24 kg.; steers, 21.5 kg.; cows, 24.88 kg.; and young cattle, 22.22 kg.; or on an average, 21.96 kg. In the case of calves, the amount of organs and fat per 100 kg. of meat was found to be 32.31 kg.; sheep, 26.88 kg.; pigs, 20.89 kg.; and horses, 10.56 kg. A large amount of data is presented regarding the weight of individual organs, and in general the report furnishes data of value in determining the actual meat consumption from slaughterhouse gross weights.

Canned artichokes and artichokes preserved in oil (*Bol. Min. Agr. Indus. e Com. [Rome], 9 (1910), Ser. C, No. 11, pp. 35, 36*).—The Italian methods of canning artichokes are described.

Honey (*Bol. Dir. Fomento [Peru], 8 (1910), No. 8, p. 12*).—Analyses are reported of 27 samples.

Analysis of Cape gooseberry, W. KING (*Chem. News, 102 (1910), No. 2666, p. 320*).—An analysis is reported of this fruit, which is much used in South Africa for making jams and preserves. The chief food value lies in the sugar which constitutes a little over half of the 17.39 per cent dry matter.

The composition of Cassia fistula fruit pastes, C. GRIEBEL (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 5, pp. 283–288*).—Analytical studies are reported of this material, which is used in a limited way as a food product and also as a drug.

How to use Hawaiian fruits, JESSIE C. TURNER and AGNES B. ALEXANDER (*Honolulu, 1910, pp. 58*).—Directions are given for preparing for the table, in a variety of ways, avocado, breadfruit, mango, and many other fruits peculiar to or commonly grown in Hawaii.

Brewers' yeast as an article of diet, F. HAYDUCK (*Umschau, 15 (1911), No. 10, pp. 195–197*).—Information is summarized regarding the preparation and use of yeast as food and also as a feeding stuff.

Cream of tartar, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 222, pp. 41*).—Out of a total number of 339 samples collected in the Dominion of Canada, 88 were found up to the British Pharmacopœia standard, 200 were up to the commercial standard, and the remainder were below this standard or adulterated.

The occurrence of poisonous metals in foodstuffs, C. FORMENTI (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 5, pp. 265–271*).—The author summarizes the results of the investigations which he has carried on regarding the possible accidental contamination of food materials by the use of tin containers, metal rollers, and in similar ways.

Changes in the physical and morphological character of foodstuffs, meat, fish, and milk by cold, BÜTZLER (*Deut. Schlacht u. Viehhof Ztg., 10 (1910), Nos. 45, pp. 623, 624; 46, pp. 639–641*).—Experimental and other data are summarized in this discussion of the effects of cold storage on food products, which was presented at the Second International Cold Storage Congress in Vienna.

Municipal chemistry, edited by C. BASKERVILLE (*New York and London, 1911, pp. IX+526, figs. 251*).—This volume contains a series of lectures on the application of the principles of chemistry to the city, delivered at the College of the City of New York during 1910.

Among the subjects included may be mentioned the following: The Purpose, Method, and Extent of Food Adulteration, and The Remedy of Food Adulteration and Relation of Chemistry Thereto, by H. W. Wiley; Food Inspection, by W. A. Hamor; Ventilation, by H. R. Moody; The Chemistry of Personal Hygiene, by T. A. Storey; Textile Materials and Their Service to Man, by L. A. Olney; and Street Sanitation with Some Special References to New York City, by W. H. Edwards.

[Food inspection and related topics], A. H. JONES (*Ann. Rpt. State Food Comr. Ill., 10 (1909), pp. 1–266, 269–302, 306–444, 452–458, pl. 1, figs. 2*).—In addition to the usual reports, a compilation of legislative enactments, tentative food standards, financial statements, and similar data, the report contains details of the analytical work carried on. Out of a total of 7,551 samples of baking powder, catsups, oleomargarine, coloring matters, extracts, milk, and other food products examined, 4,786 were declared to be legal and 2,765 illegal.

Fourth annual report of the chemical department of the laboratory of hygiene, H. E. BARNARD (*Ann. Rpt. Bd. Health Ind., 28 (1909), pp. 259–330, charts 2*).—The food and drug inspection work carried on during the year is summarized. A large number of samples of milk and other dairy products, sausage, lard, maple products, beverages, and miscellaneous food products were examined.

[Alum in pickles, bleaching flour, board of health regulations regarding minimum standards for food and drugs, and other pure food topics] (*Ann. Rpt. Bd. Health Ind., 28 (1909), pp. 88–95, 180–208*).—Circular letters, standards proposed by the state board of health, the rules of the Indiana State Board of Health governing chemical analyses and bacteriological and pathological examinations, and other data are presented.

Food commissioner's report, H P. JONES (*Bien. Rpt. La. Bd. Health, 1908–9, pt. 1, pp. 229–269*).—The work carried on under the state pure food and drug law is summarized, analyses and bacteriological studies of milk are reported, and a number of food topics are discussed.

Report of analyst, G. B. TAYLOR (*Bien. Rpt. La. Bd. Health, 1908–9, pt. 1, pp. 270–277*).—Data are given regarding the examination of a number of samples of cakes, milk, cream, salad oil, soft drinks, flavoring extracts, and other food materials, water, and drugs.

Food inspection department (*Bien. Rpt. La. Bd. Health, 1908–9, pt. 2, pp. 45–65*).—Information is summarized regarding the inspection of meat, milk, and bakeries in New Orleans, the ordinances are quoted regarding bakery inspection and the handling and sale of foodstuffs, and details are given regarding the examination of dairy products, meat products, and other food materials, water, formaldehyde, and miscellaneous products. The total number of samples examined was 4,751, the bulk of them being milk samples.

Annual report of the food and drug commissioner, Missouri, 1910, W. P. CUTLER (*Ann. Rpt. Food and Drug. Comr. Mo., 1910, pp. 87*).—During the year 608 samples of milk and other dairy products, meat products, flour, miscellaneous food products, cattle feed, and drugs were examined, of which 272 were declared to be adulterated or misbranded. It is stated that the work of the laboratory has been confined mainly to the examination of milk, cream, ice cream, butter, vinegar, and flavoring extracts.

In addition to details of the analytical work, the report contains some general discussions of pure-food topics.

Report of food and drug inspection, C. D. Howard (*N. H. Sanit. Bul., 3 (1911), No. 13, pp. 240-262*).—Data are reported regarding the examination of a large number of samples of milk and other dairy products, flavoring extracts, oysters, maple products, olive oil, canned goods, and other food materials, and of a number of samples of drugs.

Eleventh annual report on food adulteration under the pure food law, W. M. Allen and W. A. Smith (*Bul. N. C. Dept. Agr., 31 (1910), No. 12, pp. 107*).—Out of a total of 1,203 samples of baking powder, butter, catsups, beverages, ice cream and ice-cream substitutes, lard, maple sirup, vinegar, and other materials examined, 16.29 per cent were declared illegal.

The report includes data regarding prosecutions under the law and other matters pertaining to the work.

Ninth annual report of the food and dairy commissioner of the State of South Dakota, 1909, A. H. Wheaton (*Ann. Rpt. Food and Dairy Comr. S. Dak., 9 (1909), pp. 95*).—Details are given of a large number of samples examined under the state pure-food law, together with lists of butter makers, reports of creameries, financial statements, reports of officials, and similar data.

Tenth annual report of the food and dairy commissioner of the State of South Dakota, 1910, A. N. Cook (*Ann. Rpt. Food and Dairy Comr. S. Dak., 10 (1910), pp. 114*).—Out of a total of 627 samples of canned goods, dried fruits, flavoring extracts, vinegar, spices, linseed oil, paints, stock feeds, and miscellaneous products examined under the state pure food and drug law, 127 were not passed.

In addition to details regarding the examination of foods and the usual financial statements and reports, recommendations are included for laws regarding publicity, clean food, and net weight.

[Miscellaneous food topics], J. Foust (*Penn. Dept. Agr., Mo. Bul. Dairy and Food Div., 8 (1911), No. 12, pp. 107*).—Data are given regarding the analysis of dairy products, beverages, vinegar, and miscellaneous food materials under the state pure food law, miscellaneous food topics are discussed, a list is given of the licenses issued for the manufacture and sale of oleomargarine and renovated butter, and a summary is presented of other work carried on.

Biennial report of the state dairy and food commissioner, 1909-10, W. Hansen (*Bien. Rpts. State Dairy and Food Comr., State Chem., and State Dairy and Food Bur. Utah, 1909-10, pp. 1-72*).—This report contains information regarding the inspection of dairies, slaughterhouses, and food manufactories of different sorts, and similar data.

Laws of Wyoming providing for pure food, drugs, drink, and illuminating oils (*State Dairy, Food and Oil Comr., 1911, pp. 15*).—Legislative enactments on these subjects are summarized.

How to plan meals, Emma S. Jacobs (*Jour. Home Econ., 3 (1911), No. 2, pp. 162-168*).—In this discussion of family dietetics the author gives menus which she considers correctly balanced and which show the amount of each food, its cost, and its protein and energy content. To facilitate computing such data for any given dietary, she has prepared a table showing the weight, cost, and protein and energy content of individual portions of a number of common foods, the cost being based on retail figures in the Washington, D. C., market in January, 1911.

Food economy (*Bul. Kans. Bd. Health, 7 (1911), No. 2, pp. 36–45, chart 1*).—In connection with this general discussion of food and the principles of nutrition data are summarized in chart form regarding the amounts of nutrients and energy which can be purchased for 10 cts. in a number of food materials, the values being based on prices current in Topeka, Kans., June 20, 1910.

Food and efficiency of the rural population, J. KAUP (*Ernährung und Lebenskraft der Ländlichen Bevolkerung. Berlin, 1910, pp. VIII+576*).—Statistical and sociological data have been collected for the different German provinces and similar information for a number of other countries is briefly summarized.

In the concluding section the author discusses such subjects as changes which have taken place in the dietary habits of the rural population; the utilization of milk and milk products in town and country districts; the insufficiency of the national milk supply and means of increasing it, notably by an increased importation of butter; and the dissemination of information on hygiene in country districts. In general, he indicates that the admitted physical deterioration of the rural population which he is considering is in large measure due to the smaller amounts of milk and milk products now consumed and the substitution for them of less nutritious or even harmful materials, such conditions being due to the inadequacy of the general milk supply

The relationship of food to physical development, D. MCCAY (*Philippine Jour. Sci., B. Med. Sci., 5 (1910), No. 2, pp. 163–170*).—In this discussion the author summarizes investigations reported in full elsewhere (E. S. R., 24, p. 568) in support of his theory that there is a close relationship between the nutritive value of the diet, and particularly its protein content, and physical development. This he believes is clearly brought out in a comparison of the degree of nitrogenous interchanges of a number of native races, arranged according to the amount of nitrogen per kilogram of body weight. At the head of the list as regards physical development are the Nepalese Bhutias, with 0.42 gm., and the Tibetan and Bhotan Bhutias, with 0.35 gm., respectively, of nitrogen per kilogram of body weight and with a large amount of animal food in the diet, and at the bottom of the list are the Bengalis and Ooriyas, with 0.116 gm. of nitrogen per kilogram of body weight

The perils of low protein diets, A. BROADBENT (*Veg. Messenger and Health Rev., 8. ser., 8 (1911), Nos. 3, p. 82; 4, pp. 123–125, chart 1*).—The author is of the opinion that a low proteid diet does not favor longevity and in proof of this cites facts which he has observed through a long period with aged vegetarians A discussion follows the second paper.

A contribution to the theory of protein metabolism, K. SCHRAGE (*Beitrag zur Lehre vom Eiweissstoffwechsel. Inaug. Diss., Univ. Bern, 1909, pp. 15*).—Although the experiments reported, according to the author, did not lead to general conclusions, they indicate that the nitrogen retained on a high protein diet is not of necessity excreted again.

Concerning the extractives of muscular tissue.—XI, A comparative study of the nitrogenous extracts of veal and beef, W. SKWORZOW (*Ztschr. Physiol. Chem., 68 (1910), No. 1, pp. 26–39*).—The total amount of nitrogenous material in the aqueous extract of beef and veal was much the same, ranging from 0.38 to 0.42 per cent, but there were differences in the proportions of the different extractives present.

Nitrogen partition in feces, H. LABBÉ (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 19, pp. 822–824*).—By means of different extractives the author studied nitrogen partition in feces. His results, in general, showed that of the total nitrogen 45.25 per cent was soluble and 54.75 per cent insoluble. The character of the portions extracted by different solvents is briefly considered.

The synthesis of fatty acids in the body, O. Porges (*Ergeb. Physiol., 10 (1910), pp. 1–46*).—A summary and digest of data on the subject of fat formation in the body. Among other questions the author considers the oxidation of saturated and unsaturated fatty acids, the relationship between the constitution of a fatty acid and its utilization by the body, and the combustion of fatty acids in relation to the utilization of nutrients.

The synthesis of fat in body cells and the question of the relationship of its composition to fat in food, E. Abderhalden and C. Brahm (*Ztschr. Physiol. Chem., 65 (1910), No. 4, pp. 330–335*).—The authors distinguish between deposited fat and true cell fat. When the fat deposited after feeding large amounts of mutton tallow or rape-seed oil was extracted, it gave the reaction of the fats fed. The cell fat was separated from the deposited fat by digestion with gastric juice or with dilute hydrochloric acid and its composition was found not to depend upon the kind of food eaten.

The digestibility of connective tissue, R. Baumstark and O. Cohnheim (*Ztschr. Physiol. Chem., 65 (1910), No. 5–6, pp. 477–482*).—As a result of experiments with animals the conclusion was reached that connective tissue is completely digested by pepsin or in the digestive tract. Raw connective tissue is digested by pepsin and hydrochloric acid only, though this digestion may take place beyond the pylorus.

The rôle of electrolytes in the saccharification of starch by the salivary and pancreatic amylases, M. Lisbonne (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 4, pp. 132–134*).—The experiments briefly summarized emphasize the importance of electrolytes in digestive processes.

On the presence of allantoin in certain foods, H. Ackroyd (*Bio.-Chem. Jour., 5 (1911), No. 8–9, pp. 400–406*).—Bread, milk, vegetables, bananas, and rhubarb were included in the author's investigation.

His general conclusions are that "the whole quantity of allantoin excreted by man on a milk and vegetable diet may be derived directly from the food. Milk, white bread, French beans, green peas, all contain small quantities of allantoin, while none could be isolated from eggs, bananas, or rhubarb."

The utilization of the mineral salts of milk by nursing infants, F. Marre (*Rev. Hyg. et Méd. Infant., 10 (1911), No. 1, pp. 37–45*).—The results of experiments are reported.

Experiments on the metabolism of phosphorus, J. P. Gregersen (*Ztschr. Physiol. Chem., 71 (1911), No. 1, pp. 49–99*).—From his experimental data the author concludes that the body can remain in phosphorus equilibrium through a long period, or indeed make gains on a nitrogenous diet with phosphorus supplied entirely in inorganic combination.

It would appear, therefore, that the body can build up organic phosphorus compounds from phosphates and phosphorus-free organic substances. The loss of phosphorus on a nitrogen-free diet is not affected one way or the other by feeding phosphates. If the body is maintained in nitrogen equilibrium on a diet containing albumin but free from phosphorus, the phosphorus excretion is markedly diminished, in some cases so much so that it represents only one-fiftieth to one-sixtieth of the amount of nitrogen excreted. On a phosphorus-free diet containing albumin and calcium and magnesium salts, the urine contained only a minimum amount of phosphorus, a quantity less than one-tenth of the amount excreted in the feces during the same period. On the other hand, on a similar diet containing neither calcium nor magnesium salts, the urine usually contained more phosphorus than the feces, and this was also the case on a phosphorus-free and albumin-free diet which contained calcium and magnesium salts.

The experiments were made with rats.

Digestive processes, E. Bardier (*Les Fonctions Digestives. Paris, 1911, pp. XII+438+XII, figs. 29*).—In this handbook the composition of tissues, the general phenomena of digestion, mastication and muscular movements of the digestive tract, absorption, and other related topics are considered.

This is one of the volumes included in the series Encyclopedie Scientifique.

The use of biological methods in studies of the secretions and excretions of the digestive tract, H. Citron (*Arb. K. Gsndhtsamt., 36 (1911), No. 3, pp. 358–371*).—A comparative study of methods.

Fasting studies.—II, On the catalase content of tissues and organs after prolonged fasting, P. B. Hawk (*Jour. Amer. Chem. Soc., 33 (1911), No. 3, pp. 425–434*).—From chemical studies of the tissues of fasting dogs in comparison with normal animals, the general conclusion is drawn that fasting tends to lower the catalytic power of the tissues. In the case of a dog which had fasted for 2 periods, with an interval between, the tissues possessed catalytic powers which were much more comparable with normal tissues than was the case with a dog which had fasted for but a single period.

Discussing his results in comparison with other data, the author believes that the information reported regarding "higher catalase values for the tissues of adult 'repeated fasters' as compared with adult 'initial fasters' may be taken as indicating the more efficient functional activity of the repeated faster."

The metabolism and energy transformations of healthy man during rest, F. G. Benedict and T. M. Carpenter (*Carnegie Inst. Washington Pub. 126, pp. VIII+255*).—In this report the authors have summarized data collected during the 10 years or so in which experiments were carried on with the respiration calorimeter at Wesleyan University, Middletown, Conn., including work carried on in cooperation with the United States Department of Agriculture. The bulk of the material included has not been previously reported.

Among the subjects discussed in detail are changes in body weight, insensible perspiration, body temperature with its variations and fluctuations, and pulse rate. Important data obtained with the respiration calorimeter are reported regarding the vaporization of water from the body of the subject, the elimination of carbon dioxid, the consumption of oxygen, and heat elimination and heat production. Special reference is made to comparisons between the metabolism during sleep and during waking hours. The authors also consider the relationships between the various factors of metabolism, including the relation of carbon dioxid eliminated to water vaporized, the respiratory quotient, the calorific equivalents of carbon dioxid and oxygen, and the relations existing between carbon dioxid elimination, oxygen consumption, and heat production, and the relation of muscular work to these 3 factors. Special attention is likewise given to variations in metabolism due to variations in physical characteristics, age, muscular activity, sex, etc., of the subjects, including the metabolism of athletes, nonathletes, and women. A number of experiments are included which deal with the metabolism and energy transformations incidental to simple every-day body movements, such as dressing and undressing, standing, sitting, etc. In conclusion, tentative tables based on these data are given for computing the metabolism of normal individuals with varying degrees of muscular activity.

The following table gives the carbon dioxid eliminated, the oxygen absorbed, and the heat produced per hour during various activities, the data as to standing and very severe muscular exercise being calculated using as a standard the results obtained with 55 men awake and sitting up.

Carbon dioxid elimination, oxygen absorption, and heat production per hour during various activities.

Degree of muscular activity.	Number of subjects.	Average body weight.	Carbon dioxid eliminated.	Oxygen absorbed.	Heat produced.
		Kg.	*Grams.*	*Grams.*	*Calories.*
Man at rest, sleeping	17	66.6	23	21	71
Man at rest, awake, sitting up	55	64.5	33	27	97
Man at rest, standing, calculated	....	64.5	37	31	114
Man at very severe muscular exercise, calculated	....	64.5	248	213	653

"The results presented in this report are to be considered simply as indicating the normal metabolism of healthy young men at rest and under several conditions of muscular activity. The variations from the normal exhibited by the individual can be seen by an examination of the tables. The attempt is made to point out the cause of the variations in so far as possible, but with so complex a process as the energy transformation and katabolism in the body, it is clearly futile to attempt to predict with great accuracy either the katabolism or the energy transformations of a given individual. Approximate values that may prove of practical use can be obtained by means of some of the factors outlined in this report. With more accurate and improved calorimeters, there should be in the course of a few years the addition of many factors, at present entirely unknown."

Old age deferred, A. Lorand (*Philadelphia, 1910, pp. XI+458*).—Factors which affect longevity are discussed. Chapters are included on such topics as the hygiene of the intestine, rational clothing, the production and destruction or elimination of toxic bodies, the relation of different foods and dietary habits to the question of long life, and related matters.

Practical dietetics with reference to diet in disease, Alida F. Pattee (*Mount Vernon, N. Y., 1910, 6. ed., pp. XXX+527, figs. 9*).—A considerable amount of new matter has been included in this revised edition, particularly data regarding the fuel value of the foods and diets under consideration.

The author states that Mary D. Swartz Rose has assisted in the revision.

Pattee's handbag diet book, Alida F. Pattee (*Mount Vernon, N. Y., 1911, pp. VII+186, figs. 2*).—The material, reprinted from the author's Practical Dietetics with Reference to Diet in Disease (see above), consists chiefly of recipes and data regarding the preparation of invalid dishes and diets. It is designed especially for the use of nurses and it has been the author's purpose to present the material in a small volume which could be carried in a nurse's handbag.

The use of rice bran in the prevention and cure of beriberi, L. Bréaudat and Denier (*Ann. Inst. Pasteur, 25 (1911), No. 2, pp. 167–189, figs. 5*).—This discussion includes statistical, experimental, and analytical data. The general conclusion drawn is that 40 gm. of rice bran per day exercised preventive and curative action.

An extended bibliography is appended.

ANIMAL PRODUCTION.

The genotype conception of heredity, W. Johannsen (*Amer. Nat., 45 (1911), No. 531, pp. 129–159, figs. 6*).—The transmission of personal qualities is regarded as a naïve and now antiquated conception of heredity; likewise, the biometrical definition of heredity as the correlation between parent and offspring. That personal qualities of an offspring are the reaction of the gametes joined to form a zygote is the genotype conception, and personal adaptation is, in the view of the author, a matter of little importance. Heredity is defined as the presence of identical genes in ancestors or descendants. The genotype conception is advocated because of its value for further critical research rather than as a full explanation of heredity. See articles noted below.

Inheritance of acquired adaptations, P. KAMMERER (*Flugschr. Deut. Gesell. Züchtungsk., 1910, No. 12, pp. 52; Arch. Entwickl. Mech. Organ., 17 (1904), No. 2-3, pp. 165-264, pl. 1; 25 (1907), No. 1-2, pp. 7-50, pl. 1; 28 (1909), No. 4. pp. 447-545, pls. 2; 29 (1910), No. 3-4, pp. 456-498; 30 (1910), No. 1, pp. 379-408; Sci. Amer. Sup., 70 (1910), No. 1804, p. 76, figs. 4; 71 (1911), No. 1829, p. 36; Ztschr. Induktive Abstam. u. Vererbungslehre, 4 (1911), No. 3-4, pp. 279-288, pls. 3; rev. in Naturw. Rundschau, 26 (1911), Nos. 1, pp. 6-8; 2, pp. 20, 21*).—Results of experiments with toads, lizards, and salamanders extending over a series of years lead the author to infer that the changes in color and other adaptations brought about by environment are inherited.

The determination of dominance and the modification of behavior in alternative (Mendelian) inheritance, by conditions surrounding or incident upon the germ cells at fertilization, W. L. TOWER (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 18 (1910), No. 6, pp. 285-353, pls. 8, figs. 4*).—This is a paper presented at the meeting of the American Naturalists in Boston, in December, 1909. Three species of chrysomelid beetles of the genus Leptinotarsa, which hybridize freely, namely *L. signaticollis*, *L. undecimlineata*, and *L. diversa* n. sp., were used in the investigation.

Some effects of temperature upon growing mice, and the persistence of such effects in a subsequent generation, F. B. SUMNER (*Amer. Nat., 45 (1911), No. 530, pp. 90-98*).—A discussion of the necessary conditions for the fair test of the question as to the inheritance of acquired characters. Brief reference is made to the significance of the results obtained by the author (E. S. R., 22, p. 378), Tower, Kammerer (noted above), and other investigators.

Further investigations on changes in species, especially the nature of quantitative specific differences in daphnids, R. WOLTEREСK (*Verhandl. Deut. Zool. Gesell., 1909, pp. 110-173, figs. 18; abs. in Zool. Zentbl., 17 (1911), No. 23-25, pp. 756-760*).—When daphnids were overfed for several generations a widening of the head and other changes took place. After 2 years the original head form was not displayed by the young, even when returned to normal nutritive conditions, and the effect of the environment appeared to be permanently inherited.

The author maintains that a new genotype was produced by the continued action of the culture medium.

Organic response, D. T. MACDOUGAL (*Amer. Nat., 45 (1911), No. 529, pp. 1-40, figs. 5; Science, n. ser., 33 (1911), No. 838, pp. 94-101; Sci. Amer. Sup., 71 (1911), No. 1834, pp. 122, 123*).—A number of investigations, including the work of Tower, Sumner, and Woltereck, noted above, are reviewed, and the author's own investigation with plants is given in detail to show that external agencies acting upon a great variety of organisms have been seen to result in the appearance of new types of genotypes, which have been found to transmit their characters perfectly through so many generations as to indicate practical permanency. These changes may be regressions, awakened latencies, or organizations de novo, and the alterations induced by external agencies may be cumulative or mutative as to appearance or organization. They may be permanent upon first appearance, or, on the other hand, may need generations of repetition before becoming fixed.

The author presents a very strong case in support of the theory of inheritance of acquired characters, and concerning his own method of studying evolution says: "The actual transplantation of organisms from one locality to another, as a method of experimentation, promises the results of highest value and widest significance, especially when taken in connection with analytical laboratory cultures. This method of approach is one which may yield evidence of the greatest value upon the influence of isolation and other geographical factors, but is also one which allows the repetitive or mnemonic effects to be evaluated. When supplemented by laboratory analyses and cultures to determine the nature of alterations induced, such methods promise results of the greatest value."

Recent work on the inheritance of acquired characters, W. B. Alexander (*Zoologist, 4. ser., 14 (1910), No. 168, pp. 441–450*).—A résumé of investigations by Standfuss, Tower, Kammerer, and others on this topic.

Recent literature on Lamarck and Lamarckism, W. May (*Zool. Zentbl., 18 (1911), No. 1–2, pp. 1–20*).—A review of recent literature bearing ôn the inheritance of acquired characters, with a bibliography of 40 titles.

A sketch of Mendel's life and work, D. J. Scourfield (*Mendel Jour., 1911, No. 2, pp. 15–33, fig. 1*).—A brief résumé of Mendel's work in heredity.

The nucleus and heredity, V. H. Blackman (*New Phytol., 10 (1911), No. 3, pp. 90–99*).—A statement of the reasons for assigning to the nucleus the major part in the transmission of hereditary traits.

The application of the conception of pure lines to sex-limited inheritance and to sexual dimorphism, T. H. Morgan (*Amer. Nat., 45 (1911), No. 530, pp. 65–78*).—This article discusses the treatment of sex as a Mendelian character, the relation between sex and the inheritance of secondary sexual characters and the bearing of sex-limited inheritance on the problem of the transmission of characters in general.

On the effect of a differential fertility on degeneracy, K. Pearson (*Biometrika, 7 (1910), No. 3, pp. 258–275, dgms. 2*).—A mathematical demonstration that when there is a correlation between fertility and any character giving rise to genetic or reproductive selection, it may largely neutralize or wholly defeat the results of natural selection. In wild life it is difficult to find any character perceptibly correlated with fertility, but with domesticated animals and in the case of man a differential fertility has been artificially established and the influence of natural selection lessened.

Fertility of hybrids between Bison americanus and B. europæus, E. Iwanoff (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 14, pp. 584–586*).—Hybrids of both sexes proved to be fertile.

On the determination of the chief correlations between collaterals in the case of a simple Mendelian population mating at random, E. C. Snow (*Proc. Roy. Soc. [London], Ser. B, 83 (1910), No. B 561, pp. 37–55*).—A mathematical demonstration of the correlation of siblings (brothers or sisters), eldersibs (uncles or aunts) with sibmags (nieces or nephews), and of cousins in a random population.

The somatic correlation between siblings was found to be greater than that between parent and offspring. Grandparental correlation was the same as avuncular, while that of cousins is greater than that of grandparental. The ancestral and collateral correlations in man and certain animals, founded on biometric research are collected in the table following.

Mean ancestral and collateral correlations in man and animals.

	Parent.	Grand-parent.	Sibling.	Sibmag.	Cousin.
Man	0.470	0.317	0.521	0.265	0.267
Horse	.522	.296	....	....	....
Basset hound	.526	.220	.508	....	....
Greyhound	.532	.332	.559	....	....
Shorthorn	.444	.200	.530	....	....
Mean of biometric results	.498	.273	.529	.265	.267
Gametic correlation on Mendelian hypothesis	.500	.250	.500	.250	.250

Computing correlation in cases where symmetrical tables are commonly used, H. S. Jennings (*Amer. Nat., 45 (1911), No. 530, pp. 123–128*).—A method of computing the coefficient of correlation from ordinary tables by which much labor can be saved in studying assortative mating. See also a note by Harris (E. S. R., 24, p. 375).

An abac for determining the probable errors of correlation coefficients, D. Heron (*Biometrika, 7 (1910), No. 3, pp. 411, 412, chart 1*).—By means of this abac the probable errors of correlation coefficients can be read off at once correctly to at least two decimal points.

Report of the first International Congress of Breeding and Feeding (*1. Cong. Internat. Élevage et Aliment., 1910, Compt. Rend., pp. 168*).—This contains a list of the members, the proceedings of the meeting, and reports of some of the papers read.

Reports of the first International Congress of Breeding and Feeding (*1. Cong. Internat. Élevage et Aliment., 1910, Raps., pp. 524+63*).—This is a report of the papers read at the meeting held in Brussels, 1910.

The new respiration apparatus at the Berlin Agricultural College, N. Zuntz (*Umschau, 15 (1911), No. 5, pp. 92–97, figs. 4*).—A popular illustrated description of the respiration calorimeter for experiments with farm animals, which the author has recently installed. See also a previous note (E. S. R., 22, p. 375).

Chemical analyses of licensed commercial feeding stuffs, 1910, F. W. Woll (*Wisconsin Sta. Circ. Inform. 22, pp. 109*).—This is a report of the feeding stuff inspection of 1910. Analyses are reported of linseed oil meal and cake, cottonseed meal, distillers' grains, gluten and hominy feeds, wheat bran and middlings, red dog flour, rye feed, barley shorts, buckwheat feed, corn-and-cob meal, germ meal, dried brewers' grains, malt sprouts, alfalfa meal, rye bran and middlings, buckwheat hulls, blood meal, beef scrap, tankage, wheat screenings, oat hulls, clover hay, clover straw, marsh vetch (*Lathyrus palustris*), timothy hay, green silage, ground oats, flax screenings, ground corncobs, ground cornstalks, green sweet corn, cocoa bean shells, green clover, and many mixed feeds.

Licensed commercial feeding stuffs, 1911, F. W. Woll (*Wisconsin Sta. Circ. Inform. 24, pp. 1–11*).—A list of licensed manufacturers of concentrated commercial feeding stuffs for the calendar year ending December 31, 1911.

The lecithin content of meadow grass, J. Becker (*Fühling's Landw. Ztg., 59 (1910), No. 12, pp. 420–424; abs. in Zentbl. Agr. Chem., 40 (1911), No. 2, p. 144*).—An application of Thomas slag was found to increase the lecithin content of fresh meadow grass.

A contribution to the effect of plasmase, L. Greve (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 23, pp. 464–466*).—This preparation was found to contain cinnamic acid, phosphoric acid, and arsenic in organic compounds. In experiments with swine, horses, and one cow the growth was stimulated in the case of only one animal.

Fattening cattle on blue grass pasture, F. B. Mumford (*Missouri Sta. Bul. 90, pp. 289–388, figs. 5*).—A report of a 5-year series of tests in steer feeding in cooperation with this Department.

The steers used were high grade but not pure bred. The number in each lot fed varied from 6 to 10, and in all over 300 head were fed. The length of the feeding period was usually about 210 days, but in 1907 it was only 147 days. The following scale of prices was used for computing the financial statement: Shelled corn 40 cts. per bushel; linseed meal $28, cottonseed meal $24, and gluten feed $22 per ton; and pasture, yearlings 60 cts. and older cattle 75 cts. per head per month.

The following table shows the average daily gains and cost per pound gained with the different rations:

Experiments in fattening cattle on grain and blue-grass pasture.

Year.	Age.	Ration.	Average daily gain.	Cost per pound of gain.	Grain eaten per pound of gain.
			Pounds.	*Cents.*	*Pounds.*
1903..	Yearlings...	Corn	2.16	6.17	7.36
1903..	.....do.......	Corn and linseed meal 3:1	2.50	7.36	5.57
1903..	.....do.......	Corn and cotton-seed meal	2.30	6.77	5.31
1903..	.....do.......	Corn and gluten feed 3:1	2.26	6.96	5.64
1904..	.....do.......	Corn alone	2.12	6.26	7.45
1904..	.....do.......	Corn ad lib., linseed meal 3 pounds daily	2.37	7.30	6.56
1904..	.....do.......	Corn ad lib., cotton-seed meal 3 pounds daily	2.15	7.15	6.37
1904..	.....do.......	Corn ad lib., gluten feed 3 pounds daily	2.10	7.14	6.49
1905..	.....do.......	Corn alone	2.01	6.18	7.26
1905..	.....do.......	Corn ad lib., linseed meal 3 pounds daily	2.27	6.83	7.06
1905..	.....do.......	Corn ad lib., cotton-seed meal 3 pounds daily	2.14	6.96	7.48
1905..	.....do.......	Corn ad lib., gluten feed 3 pounds daily	2.12	6.84	7.50
1906..	.....do.......	Corn	1.86	6.35	7.40
1906..	.....do.......	Corn and linseed meal 7:1	2.20	6.49	6.95
1906..	.....do.......	Corn and cotton-seed meal 7:1	2.10	6.58	7.25
1906..	.....do.......	Corn alone 5 months, corn and linseed meal 7:1 2 months	2.14	6.19	7.09
1907..	.....do.......	Corn	1.97	7.81	9.48
1907..	.....do.......	Corn and linseed meal 3:1	1.86	8.97	8.91
1907..	.....do.......	Corn and linseed meal 6:1	2.07	8.09	8.76
1907..	.....do.......	Corn and cotton-seed meal 6:1	2.03	7.97	8.89
1904..	2-year-olds..	Corn alone	2.33	6.95	8.24
1904..	.....do.......	Corn ad lib., and linseed meal 3 pounds daily	2.65	7.67	8.33
1904..	.....do.......	Corn ad lib., and cotton-seed meal 3 pounds daily	2.57	7.70	8.63
1904..	.....do.......	Corn ad lib., and gluten feed 3 pounds daily	2.48	7.61	8.59
1906..	.....do.......	Corn alone	2.63	6.47	7.73
1906..	.....do.......	Corn and linseed meal 7:1	2.70	6.51	6.96
1906..	.....do.......	Corn and cotton-seed meal 7:1	2.72	6.59	7.31
1906..	.....do.......	Corn alone 5 months; corn and linseed meal 7:1 last 60 days	2.78	6.27	7.28
1905..	3-year-olds..	Corn alone	1.87	8.54	10.09
1905..	.....do.......	Corn ad lib., linseed meal 3 pounds daily	2.23	8.17	8.58
1905..	.....do.......	Corn ad lib., cotton-seed meal 3 pounds daily	2.00	8.83	9.59
1905..	.....do.......	Corn ad lib., gluten feed 3 pounds daily	2.29	7.62	8.41
1907..	.....do.......	Corn alone	2.09	8.21	10.17
1907..	.....do.......	Corn and linseed meal 3:1	2.76	9.60	10.42
1907..	.....do.......	Corn and linseed meal 6:1	3.41	7.76	8.96
1907..	.....do.......	Corn and cotton-seed meal 6:1	3.09	7.95	9.11

The results of the five years' work show that in general the gains were more uniform and a better finish was obtained when corn was supplemented with other grain. The fatter the animal the more efficient were the supplemented rations, and hence it was profitable to feed a limited amount of nitrogenous supplement during the later stages of the feeding period. Though young cattle made faster gains with nitrogenous supplements, the increase was not sufficient in most cases to make it profitable.

The influence of bedding on gains in steers, B. Tacke (*Oldenburg. Landw. Bl., 58 (1910), No. 40, pp. 437–439; abs. in Zentbl. Agr. Chem., 40 (1911), No. 2, pp. 99–101*).—In a number of tests with steers those which were bedded with straw made faster gains than those without. Peat as a bedding gave better results than straw bedding.

Raising calves on skim milk, C. H. ECKLES and G. C. WHITE (*Missouri Sta. Circ. 47, pp. 99–106, figs. 3*).—A circular containing practical information on raising calves by hand, the use of milk substitutes in calf feeding, and the general management of calves.

Cattle breeding in the district about Tabora, WÖLFEL (*Pflanzer, 7 (1911), No. 2, pp. 77–85*).—An account of the extent of the cattle industry in the central part of German East Africa, methods of management, and suggestions for improvement.

The woolen and worsted industries, J. H. CLAPHAM (*London, 1907, pp. XII+307, pls. 21*).—A general treatise on the production, commerce, and manufacture of wool and woolen goods.

On the alleged influence of the Steppes climate and vegetation of Bochara on the characteristics of the caracul fleece, L. ADAMETZ (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 3, pp. 235–303*).—A report of a detailed study of meteorological factors and food plants in the regions where the caracul sheep are raised. The author does not find that the peculiar character of the fleece is due to the soil, water, feed, or climate, but that it is a racial peculiarity of the sheep which is inherited, and consequently can be produced in other countries under favorable conditions.

Concerning the zebu and animal breeding in Germany, E. AUGUSTIN (*Deut. Landw. Tierzucht, 15 (1911), No. 12, pp. 142–144*).—The advantages of the zebu as a domesticated animal are discussed.

Observations with camels, W. MEISSNER (*Ztschr. Veterinärk., 22 (1910), Nos. 6, pp. 279–287; 7, pp. 313–331*).—This is a general account of the anatomy, conformation, and characteristics of camels, and their value as transport animals. Practical hints are given for their feeding and management in health and sickness.

Farmers' handbook on swine, A. K. SHORT (*Arkansas Sta. Circ. 2, pp. 15*).—A collection of data pertaining to the feeding, care, and management of swine. Tables are given showing the estimated cost of feed for swine when fed different rations.

Breeds of hogs.—The best crops to grow for hogs, and other data, W. H. DALRYMPLE, W. R. DODSON and S. E. MCCLENDON (*Louisiana Stas. Bul. 124, pp. 56, figs. 24*).—The characteristics of the razorback and improved breeds of hogs are described, and details are given for growing and harvesting crops which are recommended for hogs. Other topics treated are rotation of crops for hogs, portable fences, breeding crates, the Schuler methods of curing pork on the farm, and the State regulation concerning the importation of hogs.

Spanish peanuts, dwarf Essex rape, and cowpeas for swine, P. N. FLINT (*Arkansas Sta. Circ. 5, pp. 4*).—The feeding value for swine of these crops is discussed, and methods are given for growing them.

Feeding experiments with dried beer yeast, O. R. VON CZADEK (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 3, pp. 214–231*).—Somewhat faster gains were made when yeast was added to potatoes and bran in rations for swine. Analyses of the feeds, urine, and feces are given.

Hog houses, J. A. WARREN (*U. S. Dept. Agr., Farmers' Bul. 438, pp. 29, figs. 21*).—This bulletin discusses the sanitary and economical housing of hogs. Several varieties of hog houses and hog cots are illustrated and described, showing both faulty construction and well-built types. Tables are given based on astronomical calculations showing the best location of windows in order to provide the maximum amount of sunshine in hog houses in any latitude of the United States.

Fattening turkeys (*Landw. Umschau, 1910, No. 44, p. 1087; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 319*).—Methods of fattening turkeys in Germany are described, as comprising, "in the morning, barley meal, slightly cooked wheat bran, maize which has been soaked in water, and boiled potatoes; at midday and in the evening, wheat and oats. Oats are considered excellent food. The birds are allowed free pasturage."

DAIRY FARMING—DAIRYING.

Dairying, G. FASCETTI (*Caseificio. Milan, 1910, pp, 543; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 126*).—A general treatise on the dairy industry in Italy.

Trial of soy-bean cake, J. MACKINTOSH and W. GOODWIN (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 225–230*).—Soy-bean cake was found to be a palatable food for milch cows, and when fed to the extent of 3 pounds per head per day in connection with other foods it had no noticeable effect on the quantity or quality of the milk produced or on the flavor, color, or consistency of the butter.

The home of the large red dairy breed of north Schleswig, R. GEORGS (*Deut. Landw. Tierzucht, 15 (1911), No. 12, pp. 137–142, figs. 8*).—A general and statistical article, which treats of this breed and methods of breeding, feeding and management, and gives data on milk production.

The cross breeding of dairy sheep, G. SAINT-HILAIRE (*Bul. Dir. Agr., Com. et Colon. [Tunis], 14 (1910), No. 55, pp. 170, 171; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 123*).—An account of the dairy sheep in Tunis.

The Sardinian sheep is the most popular breed, but a year after exportation the milk flow decreases, and they are no longer remunerative. By crossing with the Barbary sheep a breed is obtained which maintains a better flow of milk and which is superior to the imported sheep in the yield of wool and meat, the cross producing 2 kg. of wool per year, and from 18 to 20 kg. of meat.

The action of infundibulin upon the mammary secretion, I. OTT and J. C. SCOTT (*Proc. Soc. Expt. Biol. and Med., 8 (1910), No. 2, pp. 48, 49*).—In the case of a goat infundibulin (the active principle of the posterior part of the hypophysis), when injected into the vein of the ear, rapidly and greatly increased the secretion of milk in the early nursing period.

The galactagogue action of the thymus and corpus luteum, I. OTT and J. C. SCOTT (*Proc. Soc. Expt. Biol. and Med., 8 (1910), No. 2, p. 49*).—"In experiments upon the goat with the glands containing internal secretions, we have found the corpus luteum, pineal body and thymus increased the quantity of milk fourfold in 5 minutes. The ovary minus corpus luteum had no effect. Infundibulin is still the most powerful galactagogue, increasing the secretion of milk one-hundredfold. The amount of butter fat was about the same in the augmented secretion by thymus, corpus luteum, and infundibulin, but occasionally it was increased."

Investigations on the colostral milk of the cow, the goat, and the sheep, E. WEBER (*Milchw. Zentbl., 6 (1910), Nos. 10, pp. 433–449; 11, pp. 481–492; 12, pp. 543–563*).—The literature on the subject is reviewed, and the author presents a large amount of data obtained from his own investigations on the physical and chemical properties of colostrum.

A bibliography of 164 titles is appended.

Studies on sheep's milk, A. BURR and F. M. BERBERICH (*Milch. Ztg., 39 (1910), No. 52, pp. 613–617; 40 (1911), Nos. 10, pp. 95–97; 11, pp. 105–107; 12,* *pp. 115–117*).—A continuation of earlier work (E. S. R., 23, p. 582), with a description of products made from sheep's milk, especially the methods of manufacturing cheese in Italy, France, Portugal, and Germany.

Variations in the amount of fat in milk due to variations in the times of milking, S. H. Collins (*Proc. Univ. Durham Phil. Soc., 4* (*1910–11*), *No. 1, pp. 35, 36*).—The author has coordinated the data obtained the last few years by the agricultural departments of colleges and county councils upon the composition of milk at different intervals, with the following results:

"When the intervals between milking are about 12 and 12 hours, for example cows milked at 6 a. m. and 6 p. m., then the morning fat exceeds evening fat by 0.18 per cent on the average of 22 tests. When the intervals between milking are about 13 and 11 hours, for example cows milked at 6 a. m. and 5 p. m., then the evening fat exceeds morning fat by 0.33 per cent on the average of 192 tests. When the intervals between milking are about 14 and 10 hours, for example cows milked at 6 a. m. and 4 p. m., then the evening fat exceeds morning fat by 0.70 per cent on the average of 18 tests. When the intervals between milking are about 14½ and 9½ hours, for example cows milked at 6 a. m. and 3.30 p. m., then the evening fat exceeds morning fat by 1.09 per cent on the average of 391 tests."

Variations in the coagulating quality of milk in individual herds, H. Höft (*Milchw. Zentbl., 6* (*1910*), *No. 12, pp. 533–536*).—The chemical constants of the milk of 2 herds of cows are reported. The variations in the ability to coagulate milk with 3 different rennets are presented in tabular form.

The chemical composition of milk in the eastern districts of the Cape Province, J. Muller (*Agr. Jour. Union So. Africa, 1* (*1911*), *No. 2, pp. 194–198*).—A summary is presented of analytical data obtained between the years 1903 and 1910. The average analysis of 437 samples of milk made during the period was fat 4.37, total solids 13.34, and specific gravity 1.0318.

Cooperative herd testing, W. D. Saunders and C. W. Holdaway (*Virginia Sta. Bul. 190, pp. 3–30, figs. 14*).—A study of 5 herds supplying milk to the college creamery, comprising 70 grade cows, only about half of which could be considered a good dairy type

The average milk production was 4,113 lbs., having an average of 180.2 lbs. of milk fat. The average net profit was $23.15 after deducting the estimated cost of food and labor and crediting the estimated value of the manure. Only 4 per cent of the cows gave a net profit of $50, and but 34 per cent a profit of $30. Four per cent were kept at an actual loss to the owner.

The monthly totals showed that all the winter cows dropped in their milk considerably after the first month from calving. The milk flow was increased when returned to pasture. In the college herd a ration was fed which kept the milk flow up to a fairly uniform standard during the whole winter, so that when the cows were turned out on grass there was no increase. The estimated loss during the winter from inadequate feeding in 3 herds comprising 26 cows is estimated at $143.50, or a total loss of $5.52 per cow.

It is thought that these results may be taken as representative of the conditions existing in most sections of Virginia. It is recommended that records of individual cows be kept so that the "robber" cows may be detected and eliminated from the herd.

Inquiry into methods of sampling milk (*Jour. Bd. Agr.* [*London*], *18* (*1911*), *No. 1, pp. 30–36*).—The results of a study of the efficacy of the various methods of sampling were as follows: (1) The tube method was ineffective, (2) the dipper method failed to insure in every case efficient mixing, (3) the plunger method gave results only slightly inferior to those obtained by the thorough method adopted in taking the control sample, and (4) the pouring method (pouring into an empty vessel and back again 3 times) was found to mix the milk effectively.

On the knowledge and nomenclature of bacteria found in milk and its products, F. LÖHNIS (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *29* (*1911*), *No. 12–14*, *pp. 331–340*).—A résumé of recent work to show the interrelationships of the common species of milk bacteria.

Contribution to the question of cooling milk, W. PIES (*Milchw. Zentbl.*, *6* (*1910*), *No. 12*, *pp. 537–540*).—The author reports that when milk was cooled quickly to a temperature of 4° C. bacteria multiplied more rapidly the first 24 hours than when it was cooled slowly.

The subsequent health of children who drank milk containing tubercle bacilli, A. F. HESS (*Jour. Amer. Med. Assoc.*, *56* (*1911*), *No. 18*, *pp. 1322–1324*).—A continuation of a previous report (E. S. R., 21, p. 76).

"Of 18 children who drank milk in which tubercle bacilli were demonstrated, all but one remained free from active tuberculosis during a period of supervision of 3 years; this one developed tuberculosis of the cervical glands, from which a bacillus of the bovine type was cultivated.

"From animal experiments we can conclude that the chance of infection through milk depends not only on the number of bacilli ingested, but also on the frequnency of exposure to small infections. For a quantity of bacilli which was insufficient to produce tuberculosis in guinea pigs when given in 1 dose, suspended in milk, was able to incite tuberculosis when fed in 25 to 30 doses on as many days.

"Tubercle bacilli in milk are a menace to the health of young children. Tubercle bacilli in butter are likewise a menace; therefore, a safe butter, whether pasteurized or certified, should be provided for their use."

Care of cream on the farm, F. A. JORGENSEN (*Illinois Sta. Circ. 148*, *pp. 12*, *figs. 6*).—The object of this circular is to point out the causes for the poor grade of much hand-separated cream, and to illustrate methods of arranging a place at small cost where cream may be properly kept on the farm. Directions are given for washing the separator, and methods of cooling the milk.

Farm butter making, C. H. TOURGEE (*Arkansas Sta. Circ. 6*, *pp. 4*).—This contains practical information as to the care of milk and making butter on the farm.

Investigations on the ripening of cheese milk, R. BURRI and J. KÜRSTEINER (*Landw. Jahrb. Schweiz*, *24* (*1910*), *No. 6*, *pp. 437–466*; *Molk. Ztg. Berlin*, *20* (*1910*), *Nos. 39*, *pp. 457–459*; *40*, *pp. 469–472*; *41*, *pp. 481–484*).—Data are reported on the rate of growth of bacteria and the increase of acidity in milk during ripening under different conditions.

An ingenious cow stall (*Country Gent.*, *76* (*1911*), *No. 3036*, *p. 342*, *figs. 6*).—A new type of sanitary cow stall is illustrated and described. The stalls can be washed out, and in place of a manger there is a feed pan which can be easily cleaned and when not in use is swung back on a gate in front of the cow.

VETERINARY MEDICINE.

Veterinary parasitology, R. H. SMYTHE (*London*, *1911*, *pp. XIV+129*, *figs. 29*).—This is a small compend prepared for use in veterinary schools.

Technique of sterilization, E. GÉRARD (*Technique de Stérilisation. Paris*, *1911*, *2. ed.*, *rev. and enl.*, *pp. VII+352*, *figs. 72*).—After discussing the general principles underlying sterilization, the book treats of general methods of sterilization, sterilization of glassware, surgical instruments, water, oils, fats, drugs, ampuls, surgical dressings, ligatures (and their preparation), drains, sounds, bougies, rubber gloves, and milk (human, cow's, and homogenized), the disinfection of rooms, books, clothes, etc., and the disinfection of water with ultraviolet rays.

The biological standardization of drugs, W. Hale (*Amer. Jour. Pharm., 83 (1911), No. 3, pp. 97–111*).—This article considers the various methods utilized for standardizing drugs, but has particular reference to digitalis, strophanthus, and ergot.

In regard to the reaction of the urine from domestic animals, H. Müller (*Beiträge zur Reaktion des Harns der Haussäugetiere. Inaug. Diss., Giessen, 1910, pp. 35; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No 22, p. 857*).—The urine of carnivorous animals, according to the author, is not as often acid in reaction as is generally supposed.

In the case of starved animals the urine is not characterized by acidity, nor do carnivorous animals which are fed on a vegetable diet necessarily yield a urine alkaline in reaction. It was found, however, that the reaction of the urine from herbivorous animals can be changed much quicker than that of carnivorous animals. Carnivorous animals affected with cystitis yield an alkaline urine, while herbivorous animals having marked affections of the alimentary tract, pharyngitis, pneumonia, or muscular rheumatism, yield an acid urine.

Diazo reaction of the urine of domestic animals, A. Janssen (*Uber Diazoreaktionen bei Haustieren. Inaug. Diss., Giessen, 1910, pp. 29; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 22, p. 858*).—The diazo reaction of the urine, according to the author, does not appear so constantly in animals as it does in man, but where it is present it has the same significance. It was not present in most of the febrile diseases of domestic animals. As in man, the reaction can be obtained when administering certain drugs.

Some experiments on the solubility of gases in ox blood and ox serum, A. Findlay and H. J. M. Creighton (*Bio-Chem. Jour., 5 (1911), No. 6–7, pp. 294–305, figs. 5*).—"The solubility of oxygen, carbon dioxid, carbon monoxid, nitrous oxid, and nitrogen in ox blood and ox serum has been determined at a temperature of 25° and under pressures varying from 700 to 1,400 mm. The solubility of oxygen, carbon monoxid, and carbon dioxid in blood, and of carbon dioxid in serum, is greater than in water; the solubility of nitrogen and nitrous oxid in blood and in serum, and of oxygen and carbon monoxid in serum, is less than in water. Where the solubility is increased, the solubility curves fall with increasing pressure; where the solubility is diminished, the solubility curve rises with increase of pressure. The increased absorption of oxygen, carbon monoxid, and carbon dioxid in blood, and of carbon dioxid in serum, is to be ascribed in the main to chemical combination. In the cases of diminished solubility, the rise in the solubility curve is to be ascribed to adsorption."

Peptolytic substances and immune bodies in the blood, G. B. Gruber (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 6, pp. 762–777, figs. 4*).—The results show that by injecting proteins the production of peptolytic bodies in the blood serum which have no relation to the hemoglobin is induced.

Precipitins, hemolysins, and agglutinins are produced independent of the peptolytic ferments. Peptolytic ferments and immune bodies can occur at the same time, but are distinctly different substances. The results further show that peptolytic ferments occur in markedly emaciated rabbits, even when no injections of proteins are made or when the animal is treated with trypanosomes. Peptolytic substances also occur when the animal is required to take protein foods in different forms than it has been in the habit of taking. Peptolytic ferments further occur in cachectic human patients afflicted with tumors.

Hemolysins, cytotoxins, and precipitins, A. von Wassermann (*Hämolysine, Zytotoxine und Präzipitine. Leipsic, 1910, rev. and enl. ed., pp. 124*).—This is a revised and enlarged edition of this work, which deals with the hemolysins of blood serum. Hemolysins of normal serum, isolysins and autolysins, amboceptors, complements, antihemolysins, complement binding, hemaglutinins, and the practical significance of the hemolysins are discussed by J. Leuchs, and cytotoxins and precipitins by M. Wassermann.

The influence of the reaction on the activity of hemolytic sera, P. Rondoni (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 5, pp. 515–543*).—The results indicate that hemolysis and amboceptor formation can be inhibited under certain conditions by sodium hydrate. Hydrochloric acid, on the other hand, stimuates hemolysis but inhibits amboceptor formation, though to a lesser degree than alkali.

In regard to the methods used for detecting leucocytic bactericidal substances, A. Pettersson (*Ztschr. Immunitatsf. u. Expt. Ther., I, Orig., 7 (1910), No. 6, pp. 693–701*).—Contrary to the opinion of some that the leucocytes attack only dead or dying bacteria, the author finds that the leucocytes in the animal body are capable of destroying bacteria which have the capacity to propagate. He points out, further, that the negative results which are obtained in vitro do not warrant the conclusion that no bactericidal capacity exists, even in vivo.

Guinea pig leucocytes were capable of destroying *Bacillus subtilis* without the aid of the serum.

About the theory of phagocytosis, I. G. Sawtchenko and V. A. Barykine (*Arch. Sci. Biol. [St. Petersb.], 15 (1910), No. 5, pp. 418–427*).—Only an alexin of the same origin as the leucocyte favors phagocytosis. The alexins of other species (except those of the horse) have a more or less inhibitory reaction.

Antistreptococcic serum and streptococcic immunity, W. Zangemeister (*Berlin. Klin. Wchnschr., 47 (1910), No. 43, pp. 1971–1973; abs. in Chem. Abs., 5 (1911), No. 2, p. 321*).—"An attempt is made to explain the discrepancy between the successful immunization of animals and the failure thus far of attempts at a serum therapy [for] man in streptococcic infection.

"That this is not referable to a difference in structure of amboceptor and complement in man and in the lower animals the author regards as proved by the following findings: Among a number of strains of streptococci, virulent for man, more were found to be virulent also for animals than in a corresponding number of strains nonvirulent for man; mice were protected by a potent human immune serum quite as well as by rabbit or horse serum. A potent immune serum was successfully obtained from monkeys only in those cases in which the animals survived a severe infection induced by repeated intravenous injections of large masses of living cocci.

"Local infection was found unfavorable to the development of immunity, and is to be regarded as a process differing essentially from the general systemic reaction, which possibly explains the fact that no immunity results from streptococcic infection in man. The author was able to obtain, however, in one case of severe streptococcemia, a serum which protected mice against a thousandfold fatal dose of mouse-virulent streptococci. Normal serum, whether from the same or different species, not only did not protect animals but even hastened death. Injections of fresh normal human serum in man, on the other hand, appeared to have a favorable effect in most cases."

About the therapeutic value of beer yeast in staphylococcus and streptococcus infections, W. Walzow and G. Sacharow (*Med. Obozr. [Moscow], 71 (1909), No. 10, pp. 936–942; abs. in Hyg. Rundschau, 20 (1910), No. 20, p. 1107*).—The use of beer yeast raises the opsonic index in the above-mentioned conditions. The repeated use of the yeast preparation confers a greater resistance against infection with the pus-producing organisms.

Bactericidal value of thymol, E. W. SCHMIDT (*Ztschr. Physiol. Chem., 67 (1910), No. 6, pp. 412–432; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 17–18, p. 812*).—Thymol did not prove entirely efficient for enzymological work. It is not of any value as an antiseptic or as a disinfectant with certain kinds of putrefactive bacteria, nor can it be employed as a disinfectant for digestion studies which employ an alkaline reaction and which extend over a long period of time.

A simple method for growing the meningococcus, R. BRUYNOGHE (*Centbl. Bakt. [etc.], 1. Abt., Orig., 56 (1910), No. 1, pp. 92–94*).—The method consists of adding the spinal fluid from the patient to an equal volume of bouillon, incubating for 24 hours at 37°C., and examining microscopically.

Researches in regard to Jenner's vaccination method, E. HUON (*Rev. Gén. Méd. Vét., 16 (1910), No. 187–188, pp. 361–385, figs. 6, charts 2*).—Regeneration of vaccine can be effectively accomplished by passing it through an ass. The technique employed and the results obtained with such vaccines are given.

Distillery slop disease (schlempemauke), MUSTERLE (*Munchen. Tierarztl. Wchnschr., 54 (1910), No. 12, pp. 189–192; abs. in Berlin, Tierarztl. Wchnschr., 27 (1911), No. 6, p. 105*).—The author observed in a cooperative bakery barn, where distillery slop disease (schlempemauke) often occurred, that the diluted slop mixed with roughage was allowed to stand for 12 hours before being fed. The feed during this time assumed a disagreeable, sour odor, and microscopically it showed myriads of fission fungi.

When the feed was scalded or boiled before being fed, no cases of this disease occurred over a period of 2 years.

Diagnosis of glanders with the aid of the complement deviation method, SCHÜTZ and SCHUBERT (*Arch. Wiss. u. Prak. Tierheilk., 35 (1909), No. 1–2, pp. 44–83, figs. 2*).—This is a detailed description of the application of the complement deviation or fixation reaction to the diagnosis of glanders, as based on the phenomenon of hemolysis, first noted by Bordet and Gengou.

The diagnosis of glanders by complement fixation, J. R. MOHLER and A. EICHHORN (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 136, pp. 31, pls. 5*).—The authors have in this bulletin given a detailed and practical description of the Schütz and Schubert complement fixation, complement deviation, or complement binding methods (see above) for the diagnosis of glanders.

The principles of hemolysis are explained, and the methods of obtaining the hemolytic amboceptor (rabbit serum) and the complement (guinea pig serum) and their titration are set forth. Specific complement fixation (deviation) is discussed, as well as the method of obtaining the serum of animals to be tested, the preparation of the antigen (glanders bacilli extract), and the titration of the extract. Data are given as to the application of the complement fixation test, use of controls, interpreting the results of tests, and controlling glanders in an infected stable. Results of practical tests with complement fixation are reported.

The authors point out that with a good-sized incubator and the apparatus mentioned in the bulletin it is possible for any laboratory to meet the demands for diagnoses of all the veterinarians within a State's borders, as from 80 to 100 tests may be readily made in one day.

"The agglutination test may be undertaken with the complement fixation test without a great deal of difficulty, especially if the agglutination test is carried out in accordance with the method used at the present time in Germany, by which the results of the test can be obtained in about 2 hours. This consists of a modification of the agglutination test, in which by centrifugalization the agglutination is hastened in the test tubes and the results can be read after the tubes have been placed in the incubator for 2 hours."

In order to determine how long a time after infection elapses before the reaction appears positive, the authors infected a horse by rubbing a loopful of a virulent culture of glanders bacilli upon the Schneiderian membrane. Five days after the infection a positive reaction was obtained, although the animal did not show any clinical evidence of the disease.

The blood from 787 horses from the District of Columbia and other parts of the United States was examined with the test. Some of the horses were clinical cases of glanders, others were simply exposed or contact cases, while another group was selected because they gave atypical and typical reactions with mallein. The results showed that the complement binding or deviation test gave positive findings in 97 per cent of the glanderous cases. It was also determined that in affected horses where atypical or negative results were obtained the cases were old chronic ones, or that they were fresh cases tested during the period of incubation. In all instances where the animals reacted positively and came to autopsy, lesions were noted in one or more of the organs. Among the horses tested there were also some animals which gave an atypical reaction to the mallein test, but on testing with the complement fixation test they yielded either a positive or a negative result.

According to the authors, "the results indicate that in the complement fixation we have a method which in accuracy is equal to the tuberculin test for the diagnosis of tuberculosis in cattle."

The diagnosis of glanders in the cadaver, F. P. KEYSER (*Die Diagnose des Rotzes am Kadaver. Inaug. Diss., Bern, 1910, pp. 82, pls 3; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 48* (*1910*), *No. 8, pp. 244, 245*).—As cases of occult glanders often occur and the disease is not detected before the animal is slaughtered, the author sought to determine which is the best method to detect this disease in the cadaver. On the basis of his findings he concludes that the guinea pig test and the agglutination test give doubtful results, while the complement-fixation reaction and the microscopic examination give a correct finding.

The elimination of glanders by the aid of the diagnostic blood examination, SCHUBERT (*Arch. Wiss. u. Prakt. Tierheilk., 36* (*1910*), *Sup., pp. 611–628; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 48* (*1910*), *No. 8, p. 248*).—As a result of examining 3,286 horses for glanders with the complement-fixation and agglutination tests, among which number 124 reacted positively, the author reached the following conclusions:

(1) If 0.1 cc. of a horse serum shows a complete deviation of complement the animal should be destroyed without regard to what the finding with the agglutination test may be; (2) if 0.1 cc. of the serum yields only an incomplete deviation, and 0.2 cc. produces a complete or incomplete reaction, the animal should be destroyed without regard to the finding with the agglutination test; (3) the serum of animals which do not react in amounts of 0.2 cc. should be killed only if there is an accompanying agglutination value of over 1,000; (4) horses in which the serum does not deviate with amounts of 0 2 cc., and which possess an agglutination value of not over 1,000 are to be treated as nonsuspected cases if the blood findings were obtained 14 days after the quarantine has been raised. If the blood findings were obtained less than 14 days before the quarantine was lifted, then a second blood examination is to be made 14 days after the first one, and if this yields the same results as the first one, the animals are to be considered as not diseased.

A comparison of the different methods of preparing hemorrhagic septicemia vaccine and the immunizing value of old and new vaccine for hemor-

rhagic septicemia, F. S. H. Baldrey (*Jour. Trop. Vet. Sci., 5 (1910), No. 4, pp. 592–594*).—These experiments, which were conducted with bulls and rabbits, resulted in demonstrating that a vaccine for hemorrhagic septicemia should contain dead organisms only, and no broth toxin. The latter is excluded because it sets up an irritation which prolongs the negative phase and gives the animal unnecessary pain. A further test showed that after 10 months the hemorrhagic septicemia vaccine depreciated 50 per cent in value. The disease is very analogous to human plague.

Anaplasmosis in donkeys, A. Balfour (*Jour. Compar. Path. and Ther., 24 (1911), No. 1, pp. 44–47, fig. 1*).—The author reports that in addition to cattle he has found marginal points to occur in large numbers in the blood of a number of donkeys in the Sudan, one of which was suffering from piroplasmosis. ***Rhipicephalus evertsi*** was found upon donkeys when they arrived in Khartum and the author is of the opinion that this tick will be found to convey the infection.

Some observations on the subject of marginal points, W. Jowett (*Jour. Compar. Path. and Ther., 24 (1911), No. 1, pp. 40–44, figs. 2*).—The author records the discovery of coccus-like bodies, or marginal points, in cats and rats, and also in blood films prepared from cases of equine piroplasmosis in Cape Colony.

Piroplasmosis in India, F. S. H. Baldrey (*Jour. Trop. Vet. Sci., 5 (1910), No. 4, pp. 569–579, pl. 1, dgms. 3*).—An account based on various reports made by officers of the veterinary department in India, is given. Attention is called to the fact that what appears to be the same species of Piroplasma as that recently described by Patton as *P. gibsoni* (E. S. R., 23, p. 792) was described in 1903 by Lingard as *P. tropicus*.

A list of 33 titles referred to is appended.

Atoxyl in the treatment of bovine and ovine piroplasmosis, Udrisky (*Arhiva Vet., 7 (1910), No. 4, pp. 223–227*).—Sheep suffering from piroplasmosis received 6 doses of 200 mg. of atoxyl (in 10 cc. of distilled water) subcutaneously in 2 series of 3 consecutive days, separated by an interval of 1 day. But 1 of 14 full-grown sheep treated in this manner succumbed to the disease, and as favorable results followed the administration, in a similar manner, of 1 or 1½ gm. of atoxyl to bovines.

A contribution on the treatment of canine piroplasmosis with trypanblue, H. Bumann (*Ztschr. Hyg. u. Infektionskrank., 67 (1910), No. 2, pp. 201–224, figs. 13*).—A brief review of the literature relating to the use of this dye is followed by a report of experiments personally conducted.

The paper includes a bibliography of 29 titles.

Canine piroplasmosis in Russia, W. L. Yakimoff (*Bul. Soc. Path. Exot., 4 (1911), No. 2, pp. 110–112*).—The author reports the occurrence of piroplasmosis in a dog at St. Petersburg. In inoculation experiments with 14 dogs the incubation period was found to vary from 2 to 7 days.

Immunizing cattle against anticattle-plague serum, E. H. Ruediger (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 5, pp. 353–361, charts 9*).—"Apparently anticattle-plague serum, when repeatedly injected under the skin of healthy, nonimmune bullocks, does not lead to the production of anti-immune bodies. The more serum injected into an animal the milder is the attack of cattle plague which follows inoculation with virulent blood. In this respect the immunity reactions in cattle plague are similar to those observed in many infections of known bacterial origin."

Immunizing against streptococcic infection, with particular reference to strangles, A. Marxer (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), No. 4-6, pp. 322–346; abs. in Zentbl. Biochem. u. Biophys., 11 (1910), No. 1,* *p. 57*).—By immunizing rabbits against streptococcic infection the author found that the bacteria for preparing the vaccines which were killed with urea or galactose solution were more efficient than those killed by heat. It was found that one strain of the vaccine bacteria is antagonistic to other strains of bacteria. A monovalent serum protects in the same manner. An antistreptococcic serum prepared from streptococci obtained from cases not having strangles was efficient for strangles. The serum from horses which recovered from strangles contained practically no protective bodies.

Protective and curative vaccination against tetanus, Schuemacher (*Mitt. Ver. Bad. Tierärzte, 10* (*1910*), *No. 5, pp. 75, 76; abs. in Berlin. Tierärztl. Wchnschr., 27* (*1911*), *No. 6, p. 105*).—Many cases of tetanus occurred in unvaccinated horses, whereas animals vaccinated biyearly with 10 cc. of Pasteur's antitetanic serum never took the disease. Two cases of severe tetanus were treated subcutaneously and successfully with 50 cc. of this serum on the first day, 30 cc. on the second day, and 20 cc. on the third day. Another animal which was treated at a late hour died.

In regard to tuberculosis infection and its virus, A. Fontes (*Mem. Inst. Oswaldo Cruz, 2* (*1910*), *No. 1, pp. 141–146*).—As a result of his work with filtered tuberculous pus the author considers the granulations in the tubercle bacillus the living and infective factor of the organism. It is further stated that certain typical clinical cases which yield negative results for the tubercle bacillus with the usual staining methods can be explained by the presence of these granulations in the body, as the granulations can eventually develop into tubercle bacilli.

In regard to the biology of the tubercle bacillus, H. Aronson (*Berlin. Klin. Wchnschr., 47* (*1910*), *No. 35, pp. 1617–1620; abs. in Chem. Zentbl., 1910, II, No. 19, pp. 1491, 1492*).—The specific staining power of the tubercle bacillus is due to the presence of a wax, which, according to the author, contains an alcohol which is not cholesterin. The wax can be absolutely extracted with trichlorethylen, which at the same time extracts Much's granulæ. According to this finding the latter can not consist of a particular form of protein. The solvent action of neurin for tubercle bacilli, according to the author, is due to strongly alkaline properties which the bodies have, which belong to the neurin class. The solution can also be made with tetramethyl ammonium hydrate. See also a note by Lindeman (E. S. R., 24, p. 283).

A new method for the cultural and microscopic detection of the tubercle bacillus in sputum and other tuberculous material, Uhlenhuth and Kersten (*Ztschr. Expt. Path. u. Ther., 6* (*1909*), *No. 3, pp. 759–776*).—The method consists of placing the sputum in a 15 per cent antiformin solution in a large sterile Drigalski dish which sits on a dark background. After the sputum has become liquefied the remaining flocculent masses are fished out with a platinum loop and placed in a physiological salt solution to remove the adherent antiformin. The mass is then carefully rubbed up with solidified glycerin bovine serum (6 to 8 tubes), the cotton plugs of the tubes flamed, and sealed with paraffin.

The method furnishes very good results.

Inhalation and feeding tests with tubercle bacilli and bovines to determine the smallest possible amount necessary for infection, A. Weber and C. Titze (*Tuberkulose Arb. K. Gsndhtsamt., 1910, No. 10, pp. 146–156*).—The tests showed that at least 0.00001 gm. by inhalation and 0.01 gm. per mouth of tubercle bacilli are necessary to infect bovines.

Open-air experiments with tuberculous cattle, J. G. Rutherford (*Amer. Vet. Rev., 38* (*1910*), *No. 3, pp. 313–349*).—The author, after slaughtering all clinical cases of tuberculosis in a herd, observed the 42 survivors for some time. The points which he tried to elicit were "(1) to ascertain the effects of the open-air treatment on the diseased cattle themselves, (2) to ascertain to what extent healthy cattle kept in contact with diseased cattle were subject to infection, and (3) to ascertain what percentage of healthy calves it is possible to rear without any precautions from diseased cows kept under open-air conditions. . . .

"The evidence on the whole leads to the conclusion that open-air treatment is not likely to exercise any marked curative influence on animals already tuberculous, especially when reinfection is possible through cohabitation with clinical cases. . . . The proportion of healthy calves raised from the whole herd, namely 60 per cent, is at first sight somewhat discouraging, but when it is remembered that, with one exception, all the cows on which they were reared were affected with tuberculosis, that one had a tuberculous udder, and that a number of the others were open and clinical cases, the matter assumes a somewhat different aspect. The author believes it highly improbable that such a large percentage of healthy calves could have been obtained from a herd of the same kind under ordinary stable conditions."

Should renal tuberculosis be reckoned amongst the open conditions? Kallina (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), No. 2, pp. 137–176, pl. 1; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 6, p. 104*).—Renal tuberculosis, according to the author, should be considered an open condition. The difficulty of obtaining urine samples for diagnostic purposes is pointed out.

About the tuberculin testing of cows furnishing milk for infant feeding, C. Bolle (*Berlin. Klin. Wchnschr., 47 (1910), No. 26, pp. 1227, 1228; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 10, p. 542*).—The author details his findings with 304 cows in a dairy herd which furnished milk for infant feeding purposes. In no instance was open tuberculosis present. The milk from 75 cows which reacted positively was injected into guinea pigs, with the result that only one guinea pig became tuberculous. The milk from 9 of the cows on injection produced doubtful results in 2 guinea pigs, but the rest were negative.

The author, on the strength of the above results, points out the uncertainty of the tuberculin reaction in so far that with the same animals it at times gives positive results and at other times negative results.

Tuberculin testing of cows yielding milk for infant feeding purposes, B. Möllers (*Berlin. Klin. Wchnschr., 47 (1910), No. 26, pp. 1228–1230; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 1, p. 549*).—The author considers that the clinical and bacteriological examination can not displace the tuberculin test, and therefore the latter must still be the chief factor in judging milk for infant feeding purposes.

Investigations in regard to tuberculin, A. Weber and Dieterlen (*Tuberkulose Arb. K. Gsndhtsamt., 1910, No. 10, pp. 217–220*).—This work has to do with comparative studies of the tuberculins prepared from human and bovine tubercle bacilli and the detection of the antibodies against the tuberculin in the serum of tubercular and nontubercular animals, and the question of the specific action of tuberculin given per alimentary tract.

In regard to the complement binding substances in the serum of tubercular children, R. Fua and H. Koch (*Beitr. Klinik Tuberkulose, 14 (1909), No. 1, pp. 79–86; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 11, p. 565*).—The serum from subjects treated with tuberculin contained complement binding substances, while untreated cases did not.

Klimmer's method for vaccinating against tuberculosis, A. Weber and C. Titze (*Tuberkulose Arb. K. Gsndhtsamt., 1910, No. 10, pp. 200–216*).—The results of the tests were generally unsatisfactory. See also a previous note (E. S. R., 22, p. 186).

A catechism on bovine tuberculosis, H. L. Russell and E. G. Hastings (*Wisconsin Sta. Circ. Inform. 23, pp. 24, figs. 8*).—This circular, arranged in the form of a catechism, is designed for use by those desiring information on tuberculosis, its cause, effect, and mode of distribution, the mode of application and interpretation of the tuberculin test, and tuberculosis control.

Experimental studies in regard to the etiology of tumors, S. Löwenstein (*Beitr. Klin. Chirurg., 69 (1910), No. 3, pp. 693–700, pls. 4, figs 3; abs. in Zentbl. Biochem. u. Biophys., 11 (1910), No. 1, pp. 14, 15*).—If inflammation and swelling are present, epithelial cysts can be produced experimentally. They do not possess a progressive character, and, therefore, do not conform to the Cohnheim-Ribbert theory.

The author was also able to produce hemorrhages in the bladder, such as occur in papilloma of the bladder, by injections of benzidin.

About the antigenic properties of tumor lipoids, G. Izar (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 5, pp. 624–628*).—The activity of megatheriolysin increases up to 55° C., after which it decreases until 70° is reached. At 75° the activity again increases until the boiling point is reached.

The technique of the meiostagmin reaction with malignant tumors, M. Ascoli and G. Izar (*München. Med. Wchnschr., 57 (1911), No. 41, pp. 2129–2131; abs. in Chem. Abs., 5 (1911), No. 2, p. 320*).—The powdered tumor is macerated for 24 hours with methyl alcohol at 50° C., shaking occasionally during the period. The mixture is filtered off hot, cooled, and filtered again. The antigen is prepared as usual—0.1 cc. of a 1 : 100 to 1 : 200 aqueous emulsion to 9 cc. of the serum, which has been previously diluted 20 times with 0.85 per cent sodium chlorid solution. The influence of different acids and salts on the reaction are noted. See also a previous note (E. S. R., 24, p. 780).

The meiostagmin reaction in foot-and-mouth disease, A. Ascoli (*Deut. Med. Wchnschr., 36 (1910), No. 43, pp. 1997–1999; abs. in Chem. Abs., 5 (1911), No. 2, p. 320*).—When a specific antigen (virus) was added to the blood serum of animals having foot-and-mouth disease, an increase in the surface tension of the serum was noted. This was greater than when the same addition was made to normal serum. The positive reaction is present some time after recovery from the disease.

Some diseases of swine, N. S. Mayo (*Virginia Sta. Bul. 189, pp. 3–19, figs. 6*).—Following a brief account of simple sanitary precautions and inexpensive shelter houses, the author discusses swine mange, swine lice (*Hæmatopinus suis*), "bull nose" or necrotic stomatitis, chronic pneumonia or coughing, hog cholera, and paralysis in swine, including preventive measures and remedies.

[Note on a nematode from the stomach of the pig], Foster (*Abs. in Science, n. ser., 33 (1911), No. 850, pp. 590, 591*).—Notes are presented on the occurrence of *Spiroptera strongylina* (or a new species) in the United States. A second species (*Physocephalus sexalatus*) that was found associated with *S. strongylina* is recorded from the United States for the first time and this is also said to be the first record of its occurrence in the domestic pig.

Is there any danger of disseminating hog erysipelas by immunizing with cultures of the organism causing this disease? W. Pitt (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 6, pp. 98–103*).—This is a polemical article, in which the author states that Rickmann's conclusions[a] in regard to Lorenz's serum-bacteria simultaneous method (E. S. R., 8, p. 525) are not warranted. He accompanies his argument with statistics in regard to hog erysipelas for quite a number of years.

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[a] Berlin. Tierärztl. Wchnschr.. 25 (1909), No. 35, p. 643–653.

Trichinosis in the cat, J. Ciurea (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 6, pp. 171, 172; abs. in Jour. Compar. Path. and Ther., 24 (1911), No. 1, pp. 83, 84*).—This is a report of a case of trichinosis in a cat in Roumania that apparently became infected with trichinæ through feeding on rats. The infection appeared to be one of long standing.

Fowl spirochetosis, W. Jowett (*Agr. Jour. Cape Good Hope, 37 (1910), No. 6, pp. 662–670, pl. 1, figs. 2*).—The author records the occurrence of this disease in the vicinity of Cape Town.

RURAL ECONOMICS.

The possibilities of agriculture in Ohio, C. E. Thorne (*Agr. Student, 17 (1911), No. 5, pp. 7–9, 34, 35*).—This article points out that now the free lands of the Northwest are exhausted and the migratory movement which was steadily westward for several years has practically reached its culmination, the possibilities of agriculture in the East and Middle West are being considered more carefully than ever before. The water route advantages and the several transcontinental railway systems in Ohio "offer facilities for transportation not excelled by any similar area in the world," and since more than one-half its people live in large towns and cities and are largely occupied in manufacturing industries there are excellent local markets for farm produce.

The following table illustrates the progress of agriculture in Wayne County from 1851 to 1908:

Progress of agriculture in Wayne County.

Period.	Area in crops.	Number of cattle.	Ratio of cattle to crop acreage.	Cost of fertilizer.	Yield per acre.		
					Wheat.	Oats.	Corn.
	Acres.				*Bushels.*	*Bushels.*	*Bushels.*
1851-1859	85,700	49,366	1:1.74	....	12.6	26.8	25.3
1860-1869	84,985	54,913	1:1.55	....	13.1	32.1	32.0
1870-1879	99,669	49,477	1:2.01	....	16.8	41.2	34.2
1880-1889	111,413	46,150	1:2.41	$20,646	16.9	34.2	36.2
1890-1899	115,823	39,360	1:2.94	41,643	16.1	33.6	34.9
1900-1908	115,974	36,867	1:3.14	75,682	18.4	38.0	38.7

While these figures show that there has been a general increase in the yield it is recalled that the Ohio Station by a series of systematic experiments showed that "on a tract of 40 acres, farmed in a 4-year rotation of corn, oats, wheat, and clover, the yield of corn has been increased to a 5-year average of 70 shelled bushels per acre; that of oats to 55 bushels; that of wheat to 36½ bushels, and that of hay to 4 tons."

A system of tenant farming and its results, J. W. Froley and C. B. Smith (*U. S. Dept. Agr., Farmers' Bul. 437, pp. 20*).—This bulletin discusses the fundamental principles of a system of tenant farming, showing its advantages and disadvantages and why tenant farms often deteriorate.

Special attention is directed to a system of farming in eastern Maryland organized by a merchant with no special knowledge of agriculture, a system which has maintained for over 30 years yields sufficient to keep buildings, fences, etc., in a state of good repair and pay a net income of more than 5 per cent to the estate, and at the same time give satisfactory profits to the tenants.

The account shows 56 farms on this estate and discusses the cropping system employed, terms of rental, management of live stock, relation of the farming system to fertility, value of the system, its distinctive features and its possible improvement.

Estimating rent (*In Stephen's Book of the Farm. Edinburgh and London, 1908, vol. 1, 5. ed., rev., pp. 267–270*).—The author discusses the theories and gives illustrations of different methods of determining rents, showing that all land can not be valued on the same basis because of the diversification of production. Usually the rent is estimated according to the condition of the land at the time, but in some instances an estimated interest is allowed on improvements in addition to that paid for "the indestructible resources of the soil."

Survey and record of agricultural land in the Netherlands, C. W. Hoffmann (*Verslag. en Meded. Dir. Landb. Dept. Landb., Nijv. en Handel, 1910, No. 6, pp. 33–85*).—The article gives a detailed history of registers or surveys of real estate, for the purpose of determining a basis of taxation, in the Netherlands for more than a century, and discusses and illustrates fully the methods of registering and recording, and the extent, ownership, value of lands, mortgages, and all other records pertaining to real estate.

Small holdings (*Jour. Roy. Soc. Arts, 59 (1911), No. 3048, p. 571*).—The author points out some of the defects in the small holdings act and intimates that it has been only a qualified success. In 1895 there were 299,378 holders of parcels between 1 and 50 acres in England and Wales, and in 1909 the number had fallen to 288,011. Since the passage of the act only 519 applicants out of 22,455 have expressed a wish to buy the land. It is shown that this is not due to a lack of desire to purchase but for want of necessary capital for purchase and stocking. It is pointed out that the act is deficient in that it does not facilitate purchases.

Cooperative credit banks, H. W. Wolff (*Dairy, 23 (1911), No. 268, pp. 93, 94*).—This paper discusses cooperative credit banking as it is carried on in some foreign countries and shows by comparison the stimulus it would give to agriculture, commerce, and trade in the United States. It is claimed that the system has much to commend it, since it keeps at home the money produced in a locality and enables even the smallest producer or tradesman to obtain credit on security not recognized by existing institutions.

It is held that in addition to satisfying an economic want in Germany by providing enormous sums of money, these banks have had a powerful moral influence upon their members.

Report of the working of cooperative credit societies in the Punjab for the year ending July 31, 1910 (*Rpt. Work. Coop. Credit Soc. Punjab, 1910, pp. 2+2+11+XV*).—The annual report of the working of cooperative credit societies in the Punjab for the year ended July 31, 1910, evidences greater progress in the movement than for any previous year.

It is shown that the rural societies constitute 98 per cent of the whole number, which has more than doubled within the last year, and the working capital has increased in nearly the same proportion. Deposits from nonmembers have increased 350 per cent and loans have increased nearly 140 per cent. The actual working of the rural societies and the success or failure of each is discussed in detail.

Legislation and state intervention in regard to agricultural insurance (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 1, pp. 189–196*).—This article discusses the general effects of legislation and state intervention in regard to agricultural insurance in France, giving statistical tables showing the progress made in cattle insurance in 1909, and a sketch of the results obtained by the insurance societies against hail in 1910.

There were 42,511 cattle insured in 1909 valued at 41,613,763 francs. The amount of loss was 2,659,786 francs, leaving a reserve of 709,233 francs.

Measures proposed for the regulation of the grain trade, with the assistance of the Zemstvo and the agricultural cooperative societies (*Internat. Inst. Agr. [Rom], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 1, pp. 99–106*).—This article discusses the problems of marketing or exporting the agricultural products of the small farms in Russia.

It is shown that the farmer is compelled to sell his grain as soon as harvested in order to pay his debts, and that agents of foreign houses take advantage of this necessity to compel him to sell under the most disadvantageous conditions. The problem has been partially solved in some of the provinces by the establishment of cooperative societies and the starting of special corn warehouses where the peasants deposit their grain as security and receive loans from the society. This enables them to seek the best market for their produce. In some of the provinces the societies have established direct relations with foreign markets thus eliminating a large number of small speculators as middlemen.

General uplift and increase of agricultural labor by cooperative means (*Wiener Landw. Ztg., 60 (1910), No. 69, p. 711*).—A speech delivered at the Twenty-Fourth Meeting of the German Agricultural Association in which are discussed the social and economic advantages of organized effort among agricultural laborers. It is suggested that it would tend to prevent the migration of agricultural labor and be of vast economic value to the agricultural industry of the country at large if each family of laborers should be allotted for a long term a small holding which it could call home and be given an opportunity of eventually paying for.

Law of farm service (In *Stephen's Book of the Farm. Edinburgh and London, 1908, vol. 1, 5. ed., rev., pp. 294–297*).—The provisions of the law of farm service and the workmen's compensation act of 1906 are discussed in detail.

Farm servants and wages (In *Stephen's Book of the Farm. Edinburgh and London, 1908, vol. 1, 5. ed., rev., pp. 289–294*).—The author discusses in a general way the important element of farm labor in agricultural economy, showing the general effect of increased wages upon the standard of living in the British Isles from 1850 to 1900, and the different methods of employing laborers, together with tables which show the average earnings per week in various localities in England, Wales, Scotland, and Ireland, and the variation in wages, perquisites, and farm hours in each. The following table indicates the course of wages on a large number of farms in England, Scotland, and Ireland between 1850 and 1903, the rates being expressed as percentages of those for the year 1900, which is taken as 100:

Relative rise in wages since 1850.

Countries.	1850	1860	1870	1880	1890	1900	1903
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
England and Wales	64	76	82	91	90	100	101
Scotland	50	60	71	85	91	100	103
Ireland	56	63	71	81	90	100	101

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13 (1911), No. 4, pp. 25–32*).—Statistics are given showing the condition and acreage of crops in the United States and foreign countries; the farm values and range of prices of important agricultural products; the condition of farm animals April 1, and estimated losses during the preceding year; cotton production comparisons in the United States; data on the cost of producing corn in 1909; and monthly receipts and stocks of eggs and poultry in the United States.

Agricultural statistics of India for the years 1904–5 to 1908–9 (*Agr. Statis. India, 25 (1904–1909), I, pp. III+402*).—These agricultural statistics of India from 1904–5 to 1908–9 show the area under the various crops in the different provinces and the average yield of the principal crops, together with tables showing the incidence of the land revenue assessment on the area and population, and transfers of land.

Handbook of conservation, MARY L. TUCKER (*Boston, 1911, pp. VIII+91*).—The author, who is chairman of the conservation department of the Massachusetts State Federation of Women's Clubs, presents a series of suggested topics upon the conservation of natural resources as a guide to club and classroom study and furnishes explanatory comments upon many phases of the subject.

AGRICULTURAL EDUCATION.

Agricultural education (*Farmer's Guide, 23 (1911), No. 16, p. 510*).—A brief outline is here given of the evolution of agricultural teaching in the United States from 1795 to 1857. The article also contains information concerning the growth of agricultural schools in Europe from the founding of a school at Hofwyl, Switzerland, in 1806, to the establishment of the Royal Agricultural College of England in 1845.

Vocational education, A. D. DEAN (*N. Y. State Ed. Dept. Bul. 479, 1910, pp. 191–208*).—As an introduction to the review of laws relating to agriculture, manual training, and household economics, passed in 1907 and 1908 by the several state legislatures, the author discusses and defines the scope and purpose of vocational education. He states clearly that such education should be adapted to the needs and demands of different communities and different classes of people, and that in the beginning, at least until vocational education gets its "bearings, courses of study, textbooks, and some traditions worthy of preservation," special vocational schools will need to be established.

It is his belief that the whole question of vocational education is one for a state government to consider, that the state and the local communities should share in its expenses, and that the control of vocational education should be in the hands of existing state boards of education rather than under the direction of special commissions established for the purpose. The State needs also to give attention to the training of teachers for such work. Vocational education should be divided into three phases: (1) Intermediate, for children from 14 to 16 years of age, giving a training preparatory to entering occupations in the field of agricultural, trades, and manufacturing industries; (2) secondary, for pupils 16 or more years old, with a more or less direct connection with the intermediate vocational training and highly specialized courses for the development of skill and knowledge of direct practical value; and (3) advanced vocational or technical training which is already provided for in the system of land-grant colleges.

Agricultural education, W. H. FRENCH (*Moderator-Topics, 31 (1911), No. 31, pp. 619, 620*).—This article mentions the different phases of agricultural work that may be done in a high school and a few problems which have been solved by the young men in some of the Michigan schools.

The teaching of agriculture in the high school, G. A. BRICKER (*New York, 1911, pp. XXV+202, pls. 16, figs. 3*).—The author considers in this book three critical problems of vocational education. The first of these concerns itself with the desirability of establishing separate schools for the teaching of agriculture; the second has to do with the possible outcome of any form of education that makes a strong appeal to economic motives; and the third, the possibility that, in the emphasis necessarily placed upon the economic factor, the broader "cultural" values of the study of science may be lost to view.

The book deals with the nature of secondary agriculture, the rise and development of secondary education in agriculture in the United States, and the social results of secondary agriculture, claiming that "the adolescent boy or girl should live in an elementary way the life that he expects to live more intensely later; and the more nearly the high school approaches this ideal condition, the better is the school." It is argued that secondary agriculture should be taught as a separate science. Other subjects discussed are the psychological determination of sequence, the seasonal determination of sequence, the organization of the course, aims and methods of presentation, and the organization of the laboratory and field work. An illustrative list of classified exercises is given, and a rough classification of recent textbooks on general agriculture is arranged in an appendix. Dr. W. C. Bagley states in the introduction that "if the essence of true culture is to see the fundamental and eternal shining out through the seemingly trivial and transitory, there is no subject better adapted to provide culture than the subject of agriculture."

General agricultural chemistry, E. B. Hart and W. E. Tottingham (*Madison, Wis., 1910, pp. 334, figs. 22*).—The authors of this book give a survey of the general field of chemistry applied to agriculture. It treats of such subjects as the soil, crops and their essential food requirements, commercial fertilizers and their ingredients, the part played by the atmosphere and natural waters in making available plant food, a study of the animal body, feeding standards, food requirements of animals, and milk and its products. An appendix containing tables for reference is a feature of the book.

Laboratory exercises in farm management, G. F. Warren and K. C. Livermore (*New York, 1910, pp. XII+158*).—This is a laboratory guide devoted almost entirely to exercises and problems in the various phases of farm management. They deal with the business of farming, the selection and purchase of the farm, its management under different systems, and such questions as marketing and keeping farm records. Twenty-two pages are devoted to references to the literature.

The accredited farm system, D. H. Otis (*Wis. Country Mag., 5 (1911), No. 4, pp. 129–132*).—The author describes a system of instruction of an advanced nature in farm practice recently inaugurated by the college of agriculture of the University of Wisconsin on 12 accredited farms in Wisconsin, as previously noted (E. S. R., 24, p. 497), and gives details concerning the factors that are considered essential in the selection of accredited farms and the prerequisites for students seeking positions on these farms.

Judging and testing corn, D. W. Working (*W. Va. School Agr., 1 (1911), No. 4–5, pp. 66–88, figs. 11*).—Twelve lessons are outlined for schools on the method and purpose of judging and testing seed corn. Each lesson is accompanied by a laboratory exercise and one or more references to helpful literature.

Studies of aquatic insects, L. S. Hawkins (*Nature-Study Rev., 7 (1911), No. 4, pp. 91–96*).—A suggestive outline for the study of aquatic insects in the grades is given for the fall and spring. It is suggested that this work may be correlated with art and English. The first lesson should be occupied with a study of the insects. Following this may be the drawing lessons, and then the study of the literature of the subject.

Lessons from the forest, E. R. Jackson (*Amer. Forestry, 17 (1911), No. 1, pp. 3–18, figs. 14*).—The author discusses in a general way the place of forestry in public school education, and then takes up more specifically the relations of forestry to nature study, elementary agriculture, botany, and geography in public school courses, showing in each case some interesting points of contact.

Outline lessons in housekeeping, including cooking, laundering, dairying, and nursing for use in Indian schools (*U. S. Dept. Int., Off. Indian Aff. [Pub.] 1911, pp. 23, fig. 1*).—This manual has been compiled from the results of practical experience in the work of instruction in the Indian schools. It contains a list of reference books and text-books, estimates for equipment, outline lessons for the first, second, and third terms in cooking, laundering, dairying, and nursing, and a tentative program of a week's work in a boarding school.

Synopsis of course in sewing (*U. S. Dept. Int., Off. Indian Aff. [Pub.], 1911, pp. 38, figs 17*).—This is an illustrated practical manual consisting of suggestions intended to assist teachers in giving instruction in sewing. It has been compiled from the results of practical experience in the work of instruction in Indian schools.

[Domestic science], MINNIE L. JAMISON (*Bul. N. C. State Norm. and Indus. Col., 1 (1910), No. 1, pp. 43, pls. 3*).—An account is given of the home economics courses offered at the North Carolina State Normal and Industrial College, together with a large number of recipes and directions for preparing foods of various sorts, and a discussion of kitchen conveniences for use in warm weather.

Report of the women's institutes of Ontario, 1910, G. A. PUTNAM (*Rpt. Women's Insts. Ontario, 1910, pt. 1, pp. 112*).—This report contains (1) statistics showing that the Province of Ontario has 90 women's institute districts, that the institutes in 1909–10 had a total membership of 16,104, that 5,483 meetings were held with a total attendance of 140,388, that 8,171 papers were read or addresses delivered at the institutes, and that the total receipts of the insitutes were $20,235, and the total expenditures, $12,685; (2) addresses and discussions delivered and reports submitted at the annual convention, held at the Ontario Agricultural College, December 8–9, 1909; (3) a selected list of papers and addresses; and (4) a list of officers of women's institutes.

Agricultural education: Boys' agricultural clubs, B. M. DAVIS (*El. School Teacher, 11 (1911), No. 7, pp. 371–380*).—In this article the author reviews the literature concerning the early phases of the boys' agricultural club movement, gives considerable information secured by correspondence with those actually directing agricultural club work, and discusses the value of such work in bringing about a redirection of education in the country.

School gardening for Nebraska boys' and girls' club, ANNA V. DAY (*Nebr. Dept. Pub. Instr. Bul. 1, 4. ser., 1911, pp. 12, figs. 5*).—Suggestions are given in this pamphlet for the planning, planting, and cultivation of school gardens, together with specific instructions concerning the culture of some of the more common garden vegetables and flowers

School gardens of the Hawaiian Islands, V. MACCAUGHEY (*South. Workman, 39 (1910), No. 7, pp. 377–382*).—This is a brief account of the development, characteristics, purposes, and management of school gardens in Hawaii, including a list of books relating to school gardens.

School gardens in Jamaica, P. W. MURRAY (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1911), No. 4, pp. 280–285*).—This lecture delivered at the agricultural course for school teachers in 1911 defines the functions of school gardens as to bring the child in touch with nature and enable him to appreciate it, to develop the power of observation and accuracy, to train directly for life's vocation, and to correct the tendency to avoid agricultural pursuits now evident in certain portions of the island. It also discusses school gardens in home life, school gardens as practical object lessons for classroom work, planning a garden, the practical use of school gardens, experimental work in school gardens, and their ornamental aspects.

School gardens in Ireland (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1910), No. 1, pp. 129–131, pls. 2*).—This is a brief description of school garden work in Ireland, showing the methods adopted in putting to practical use the gardens attached to the country national schools.

These methods may assume one of the following three forms: (1) In which the teacher, having himself received some training in agricultural and horticultural practice, directs and supervises the laying out of the garden into plats for the cultivation by the pupils of the more common farm crops and kitchen vegetables; (2) in which the space is utilized solely for the cultivation of the vegetables more generally required in plain domestic cooking, the chief object aimed at being to make the pupils familiar with the use of the ordinary garden tools and to give them a practical knowledge of vegetable cultivation; (3) in which the school garden may be chosen as a suitable center for a horticultural demonstration plat, enabling students to follow, under the direction of the teacher, the best methods of growing vegetables and fruit.

An account is given of three typical school gardens representing the above classifications, viz, at the Tallow National School, County of Waterford, the St. Johnston National School, County of Donegal, and the Newmills National School, County of Tyrone.

School gardening and nature study, I, J. C. Willis (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1910), No. 5, pp. 39–46*).—This circular contains general directions for making school gardens ornamental as well as useful.

NOTES.

Colorado College and Station.—The general assembly has made appropriations to the college aggregating $200,000, of which $90,000 is to be used for improvements and maintenance, including $10,000 for general station and extension work.

The assembly also accepted the Fort Lewis and the Grand Junction Indian schools from the Federal Government, and passed a bill reorganizing them as secondary schools of agriculture and mechanic arts under the direction of the State board of agriculture. An appropriation of $60,000 was made for the Fort Lewis school during the next biennium, and $10,000 for the Grand Junction school. The latter institution will not be in operation the next two years, except that the buildings will be used for short courses in agriculture and home economics. G. F. Snyder, formerly principal of the Sauk County Training School in Wisconsin, has been appointed principal of the Fort Lewis school, which it is planned to open next fall.

Hawaii College.—According to a note in *Science*, an appropriation of $75,000 was granted by the recent Territorial Legislature in addition to $20,000 for maintenance. Grounds comprising about 90 acres, of which 30 acres were set aside by the Government, are now available at Manoa.

Iowa College and Station.—The legislature renewed for another period of 5 years the mill tax for the erection of buildings. It is estimated that over $1,000,000 will be available for this purpose during the next 6 years. A library to cost $225,000 and a stock-judging pavilion to cost $20,000 were among the buildings definitely authorized.

Special appropriations were also made of $60,000 for equipment of the domestic technology building, gymnasium, and veterinary hospital, $6,000 for improvement of the grounds, $43,000 for the heating plant, $50,000 for general instruction, $18,000 for extension work, $15,000 for the station, and $5,000 each for the engineering experiment station, the roads work, and the 2-year-course.

C. V. Gregory, bulletin editor and head of the agricultural journalism department, has resigned to become editor of the *Prairie Farmer* of Chicago.

Cornell University.—The college of agriculture is holding its first summer school from July 6 to August 6. The special purpose is the training of teachers in agriculture, nature study, and home economics, and groups of courses in each of these subjects are being offered.

Texas Station.—Director H. H. Harrington has resigned, to take effect July 1. He becomes agricultural director of the St. Louis, Brownsville and Mexico Railroad, with headquarters at Kingsville, Texas.

Utah College and Station.—The legislature at its recent session provided a permanent appropriation for the maintenance of the college of slightly more than one-third of a mill, which it is estimated will amount to $150,000 during the ensuing biennium. The legislature also increased the number of trustees from nine to thirteen, and provided that the secretary of state should be a member of the board. The following new appointments were made: J. A. Hyde, Nephi; Angus T. Wright, Ogden; J. M. Peterson, Richfield, and C. S. Tingey, secretary of state, Salt Lake City (ex officio).

A bill was passed allowing the college to offer degree courses in agricultural engineering, this to include courses in irrigation, drainage, public roads, water supplies and sanitation, farm buildings, and farm machinery.

Special laws were enacted granting permanent annual appropriations for the maintenance of the extension work and of the experiment station. These provide $20,000 for extension work and $30,000 for the experiment station during the biennium. A special appropriation of $50,000 was made for a gymnasium, to which Hon. Thomas Smart, of the board of trustees, added $10,000, and from other sources $5,000 more was contributed. Forty thousand dollars was also appropriated for a power and light plant. The lands and buildings of the Panguitch Indian School, recently turned over to the State, were transferred to the experiment station, together with an appropriation of $2,500 for equipment. These appropriations, together with the mill tax, will give the institution a little more than $300,000 for the biennium.

With the increase in funds for extension work, Prof. J. C. Hogenson will devote his whole time to the extension department, being located in Salt Lake City; Prof. John T. Caine, III, will give the greater part of his time to extension work, and a domestic science teacher for extension work will be employed.

F. S. Harris, formerly assistant chemist of the station, and more recently assistant in soils at Cornell University, has been appointed agronomist of the college and station. Mr. Harris takes his doctor's degree at Cornell this year. Ernest Carrol, M. Sc., of the University of Illinois, was appointed assistant professor of animal husbandry and associate in the station work. Frank L. West takes his Ph. D. from the University of Chicago this year and returns to his position as professor of physics. He will take up work in meteorology and soil physics with the station. C. N. Jensen, an assistant in plant pathology at Cornell University, has been appointed professor of botany and plant pathology and plant pathologist of the station. Mr. Jensen has been granted leave until January 1, 1912, in order to complete his work at Cornell.

E. G. Peterson, professor of bacteriology at the Oregon Agricultural College, has been appointed professor of bacteriology in the college. Prof. Peterson will receive his Ph. D. from Cornell this year. Prof. E. G Titus, on leave for postgraduate work in Harvard University, returned July 1. J. E. Greaves, associate chemist, has returned from postgraduate work in the University of California with the degree of Ph. D. Erastus Peterson, assistant in agronomy, resigned in April to enter commercial work. A. E. Bowman, of the graduating class, has been appointed to the position. L. M. Winsor, another graduate, has been appointed assistant in agronomy and irrigation, and has taken charge of the cooperative work with the settlers on the recently opened Uintah Reservation. Fred Froerer, another graduate, has been appointed assistant in dairying and will take charge of cooperative milk testing work in the State.

Vermont University.—Dr. Cyrus G. Pringle, curator of the herbarium for many years and an early plant breeder and botanical collector, died May 25 at the age of 73 years.

Dr. Pringle began his extensive collections in 1874, and in the years following covered especially the Rocky Mountain region in this country and the entire territory of Mexico, for which country he was for several years official collector and on the flora of which he became a recognized authority. He had been botanical collector for Harvard University since 1885, and for several years forestry and botanical collector for the American Museum of Natural

History. The Pringle Herbarium at the university, containing nearly 100,000 plants from all over the world, remains as a lasting monument to his life work.

Dr. Pringle will also be remembered as one of the early plant breeders of the country. Among his productions was a beardless wheat bearing his name, which is believed to have been the first variety of this type to become commercially successful. He also developed high grade varieties of oats, and gave considerable attention to the improvement of potatoes.

Wisconsin University and Station.—According to a note in *Chicago Dairy Produce*, A. C. Baer has been appointed to take charge of a new line of work dealing with problems of city milk supply and ice-cream making. Courses of instruction will be offered for the training of students for positions in the city milk trade and ice-cream manufacturing plants, and investigations of some of the unsolved problems will be inaugurated.

A course in agricultural advertising is being offered in the university in connection with the work in agricultural journalism. The course comprises lectures on methods of farm advertising and practice in the writing of advertisements of live stock, seeds, dairy products, etc.

The Pure-bred Sire League is being organized by the department of horse breeding, as a voluntary nonincorporated state and national organization for the improvement of farm live stock by the use of pure-bred registered sires.

According to a note in *Science*, J. C. Marquis, instructor in agricultural journalism and agricultural editor, has resigned to accept the editorship of *Country Gentleman*, and has been succeeded by John Y. Beaty, associate editor of *Farm and Home* and *Orange Judd Farmer*. A. J. Rogers, jr., has resigned as instructor in horticulture in the university and assistant horticulturist in the station to engage in fruit farming in Michigan.

Wyoming Board of Farm Commissioners.—Under a law recently enacted by the legislature a board of three farm commissioners is to be appointed by the governor to direct experiments in dry farming. This board may employ a director of experiments and must report December 1, 1912, and biannually thereafter. An appropriation of $5,000 per annum is provided for carying out the act.

U. S. Commissioner of Education.—P. P. Claxton, professor of education at the University of Tennessee, has been appointed U. S. Commissioner of Education to succeed E. E. Brown, who has resigned to accept the presidency of New York University. Prof. Claxton will assume the duties of his new position at the close of the Summer School for the South late in July.

Additional Experimental Farms in Quebec.—Land has been acquired by the Canadian Government for two experimental farms in Quebec. One of these is at Cap Rouge, near the city of Quebec, with over 300 acres of land and substantial farm buildings. The second farm is at Ste. Anne de la Pocaterie in Kamouraska county and has an area of about 125 acres.

New Experiment Stations in Spain.—Recent numbers of *El Progreso Agricola y Pecuario* announce the establishment of an agricultural experiment station at Burgos and of enological stations at Aranda de Duero, Felanitz (Baleares Province), and Valdepeñas.

Special Training Courses for Employees of the Philippine Bureau of Agriculture.—Because of the handicap under which the Philippine Bureau of Agriculture has labored in having to draw veterinarians from the United States, where rinderpest, surra, and foot-and-mouth diseases do not exist, it has been found necessary to establish special training courses for employees of the bureau, in cooperation with the College of Veterinary Science. These courses deal with the characteristics of Philippine animal diseases, including selected reading on subjects connected with tropical veterinary sanitary science, lectures, and discussions, and observation trips to important centers of veterinary work. Instruction is also given in the specific duties of the various officials.

As the facilities improve, it is intended so to expand the course as to make it more closely resemble the postgraduate training courses of the army and navy medical schools and the laboratory training course of the United States Public Health and Marine-Hospital Service. Other more elementary work is under consideration, including the training of the Filipino assistants.

Agriculture at Syracuse University.—A bulletin has been issued by Syracuse University announcing (1) a four-year course in agriculture, leading to the B. S. degree, and entitling graduates to the special certificate authorizing them to conduct agricultural courses in high schools subsidized by the State; (2) agricultural instruction in the university summer school for 1911; and (3) short winter courses in dairy husbandry and agriculture, beginning January 4, 1911.

The college courses will be available in September, 1911, but according to the announcement the work to be provided at that time is considered merely a preliminary step toward the establishment of a regular agricultural course. In this preliminary work the present facilities of the university will be utilized in conducting courses "leading to specialization in agriculture with the aim of preparation for practical farm management or for teaching agriculture in the high school or other schools." The courses offered are in agricultural bacteriology, agricultural botany, animal breeding, animal nutrition, agricultural chemistry, agricultural economics, rural social conditions, agricultural engineering, rural architecture and landscape design, economic entomology, agricultural geology, and meteorology, with field laboratory work and practical studies in farm management.

Progress at the Saskatchewan Agricultural College.—The buildings of the college will not be fully completed this fall, but it is hoped that a few students may be accepted. Work on the central building has been in progress for over a year; the stock-judging building, the agricultural engineering building, and the power plant are practically completed, and a dormitory, a horse and cattle barn, and a sheep barn will be built this summer.

The judging pavilion, which will cost $42,000, is a fireproof brick and cement structure, having a judging ring 90 feet long by 25 feet wide, and seating about 500 people. There is also a slaughter room with a seating capacity of 125, with a cooling room on one side and immediately adjoining it a large refrigerating room. A room for smoking meats is also provided.

The agricultural engineering building is 125 feet long by 75 feet wide and will cost about $60,000. A complete course in farm engineering for the agricultural students is being outlined. Agricultural extension work is under way, and experimental work is being organized as a part of the college work.

A New College of Agriculture in the Cape of Good Hope.—A new college of agriculture, known as the Grootfontein College of Agriculture, has recently been opened at Middleburg, on a site until recently occupied by a military remount station. This location is especially adapted to the purpose of agricultural instruction and demonstrations because it is typical of a vast area and is suitable for practical and scientific instruction in the breeding and management of ostriches, cattle, horses, sheep, goats, and pigs, and in dry-land farming, irrigation, and dairying. A research branch of the Cape agricultural department is also to be established.

R. W. Thornton has been appointed principal of the college. Eventually there is to be accommodation for 150 students, but at present only 50 will be admitted. The course of study, which extends over 2 years and leads to a diploma, comprises instruction in agriculture and live stock, veterinary science, dairying, poultry farming, chemistry, botany, entomology, mechanics, mensuration, surveying, irrigation, agricultural engineering, and bookkeeping, and all kinds of practical work on the farm and in the dairy and shops. For the present applicants will be admitted from the seventh grade, but after January 1, 1913, only students who hold the matriculation examination certificate of the Cape University, or its equivalent, will be admitted. Numerous scholarships are available, including one of $729 a year, tenable for 2 or 3 years, to be awarded annually for advanced and specialized study abroad.

Short courses will be conducted during vacation periods in such subjects as irrigation, butter and cheese making, etc., provided sufficient funds are available.

Normal School Agricultural Institute.—The Central State Normal School, Mt. Pleasant, Mich., announces a five-day institute on agricultural and rural topics. The heads of the departments of chemistry, bacteriology, soils, horticulture, and forestry of the Michigan Agricultural College and members of the agricultural and home economics faculty of the normal school will discuss their subjects in relation to the rural schools, and a representative of the state grange will discuss The New Rural Sociology. There will also be discussions of the new rural spirit and conferences on various subjects taught in the rural schools.

An Agricultural High School in a Normal School.—The Third District Normal School, at Cape Girardeau, Mo., in addition to its regular courses for teachers, is conducting an agricultural high school. The work includes (1) a four-year secondary course intended to fit young men either for farm life or to enter an agricultural college, (2) a boys' short course, running 6 weeks in winter and confined to farm mechanics and agricultural science, and (3) a school for farmers, lasting from 10 days to 2 weeks.

National Farm School.—Pennsylvania Hall, the new dormitory recently erected by the State of Pennsylvania, was dedicated June 4 by Governor John K. Tener. Between six and seven hundred visitors were in attendance. Among other addresses was one by Jacob A. Riis, of New York City, and one by ex-Senator Lafayette Young of Iowa.

Agriculture in a Trades School.—The trustees of the Williamson Free School of Mechanical Trades, which is located about 16 miles from Philadelphia in Delaware County, Pa., have decided to add agriculture to the list of 5 trades now taught in the school. The work of the institution is of elementary grade.

School Farms.—According to the *Farm and Fireside* of April 25, the superintendent of schools in Wake County, N. C., assisted by the Women's Betterment Association of the county, has successfully inaugurated 11 school farms, each having an area of about 2 acres and planted to cotton, tobacco, corn, and wheat. These are conducted in connection with rural schools, and are worked by both children and adults, each work-day on the school farms being made a social event. Over 1,200 persons have participated in the work.

Agriculture in the Public Schools.—According to a recent issue of *Deseret Farmer*, the state board of education of Utah has provided that every accredited high school in the State must teach agriculture in order to participate in the maintenance fund provided for high schools.

A New Agricultural School in Yucatan, Mexico.—An agricultural school is soon to be established in the State of Yucatan by the department of promotion, acting conjointly with the governor of Yucatan. In connection with the agricultural school there will be a department for instruction in the various crafts. The entire institution will be known as the Lorenzo Ancona Castillo School, and will be in charge of a president to be selected annually. The ground for the building has been selected and the plans of some of the buildings prepared.

Actual building will be begun as soon as possible and it is planned to have the school in operation by next winter.

A New Avicultural School in Argentina.—The Consul General of Buenos Aires reports that a school of aviculture is to be established at La Plata as an annex to the zoological garden, to give instruction in poultry and bee keeping and in the rearing of rabbits and pigeons, the latter for consumption and as carriers. A course in carpentry and other trades necessary in the work of an aviculturist will also be offered.

A Vernacular Agricultural School in Bombay.—A vernacular agricultural school was opened as an experiment at Poona on June 10, 1910, in charge of K. M. Pawair and an assistant. Twenty-one boys were admitted to the 2-year course, which is open preferably to boys between 13 and 16 years of age. A part of the agricultural college farm is to be used for practical work, the boys spending 16 out of 32 school hours a week in actual field work.

County Staffs of Instructors in Agricultural Subjects in England and Wales.—A report has recently been issued by the rural education conference, which was established by the presidents of the Board of Agriculture and Fisheries and the Board of Education in 1910, with reference "as to whether it is desirable that each county should have its own staff of instructors in agriculture, horticulture, and other allied subjects, or whether it is possible that the services of a single staff should be made available for groups of contiguous counties; as to the training and qualifications which such instructors should possess in order to enable them to secure the confidence of agriculturists; and as to the manner in which the staff should be composed for each county, or group of counties, in England and Wales, in view of the different branches of rural industries followed in each locality."

The conference reviews the status of the different counties in this respect and states that the great majority of the counties have a separate staff of their own, which is often supplemented and the work supervised by the staff of the center with which the county is associated; and that the only grouping of counties is for the purpose of establishing or assisting to maintain a joint college or institute, or more often arises out of association with such a center for agricultural education and research. In the case of certain counties no center at present exists with which they could conveniently be associated. The conference considers that every county either should be associated in combination with other counties with an efficient center, or if not in combination, should have a minimum efficient staff of its own; that it is desirable, especially in view of the difficulty of obtaining trained teachers, to concentrate higher agricultural education as far as possible in a few efficient centers; that any county council which is unable or unwilling to establish a minimum staff of its own, should associate itself with the council of an adjoining county; that the minimum staff should consist of an agricultural organizer or adviser, a horticultural instructor, and in most counties, a dairy instructor, to be supplemented by competent scientific investigators from the university or agricultural college, and instructors in special branches of agriculture. The report also defines the duties and qualifications of such a staff and gives specimens of existing staffs of typical counties.

Agricultural Education in Hungary.—Consul General Paul Nash, of Budapest, reports that agricultural subjects are taught in all Hungarian schools. There are 7 agricultural colleges with experiment stations for the maintenance of which the budget for 1911 provides $192,000. There are also 32 agricultural schools of lower grade for which the cost of maintenance in 1911 is estimated at $865,000. Of this Parliament has appropriated $702,000, the balance coming from tuition fees, etc.

Necrology.—Through the death of Dr. Saturnin Arloing, the noted French bacteriologist and director of the Veterinary School of Lyon, which took place March 21 at the age of 65 years, the veterinary profession has lost one of its leaders.

Dr. Arloing graduated from the Lyon Veterinary School in 1866 at the age of 20. Soon after he joined the staff of this school and remained until 1870, when he was called to the chair of anatomy at the Toulouse Veterinary School. He returned to Lyon in 1876 as professor of physiology and 10 years later was appointed director of the school, a position which he held until his death. In 1884 Dr. Arloing was also appointed professor of physiology to the Faculty of Sciences at Lyon and 2 years later to the chair of experimental and comparative medicine. In 1900 he founded the Pasteur Institute at Lyon.

Dr. Arloing conducted valuable studies in anatomy and physiology, particularly of the nervous system, the sterilizing action of sunlight on anthrax spores, the rôle of streptococci in puerperal septicemia, on toxins, antitoxins, etc., and was a collaborator in the preparation of recent editions of Chauveau's Comparative Anatomy and the author of a valuable work on histology. His principal work was in the field of bacteriology; with his collaborators, Cornevin and Thomas, he was the first to demonstrate fully and describe the bacillus of symptomatic anthrax. The method of protective inoculations against the disease which these 3 workers devised has since been practiced successfully throughout the world. It was, however, to the investigation of tuberculosis that a large part of his time was devoted, during the last 10 years special attention being given to the antituberculous inoculation of cattle. In 1908 he visited this country and participated in the meetings of the International Congress of Tuberculosis, being one of the leading opponents of Koch's theory of the nontransmissibility of the bovine type of the tubercle bacillus to man.

During his lifetime Dr. Arloing received many public and professional honors, such as the Commandership of the Legion of Honor, membership in the National Academy of Medicine, and honorary membership in the American Veterinary Medical Association.

Country Life Meeting in Vermont.—At a recent meeting at White River Junction, Vt., under the auspices of the Windsor County Y. M. C. A., addresses bearing on the country life problem were delivered by ex-President Theodore Roosevelt, President Kenyon L. Butterfield, of the Massachusetts Agricultural College, and Albert E. Roberts, international secretary of the Y. M. C. A. President Butterfield took for his subject The Cooperation of Community Institutions, pointing out that rural progress is to be attained through the cooperation of all forces interested in rural development.

Sixth Dry Farming Congress.—The 1911 session of this congress will be held at Colorado Springs, Colo., October 16–20.

Miscellaneous.—R. Newstead, lecturer in economic entomology in the Liverpool School of Tropical Medicine, has been appointed to the newly established professorship of entomology in the University of Liverpool.

The April *Bulletin of the Pan American Union* states that Fernando Bercelo has donated for a period of ten years 250 hectares of land in Bahia Blanca, Argentina, for the establishment of an industrial agricultural school.

A recent number of the *Deutsche Landwirtschaftliche Presse* announces the establishment of a chair of city and rural architecture at the Technical High School of Danzig.

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EXPERIMENT STATION RECORD.

VOL. XXV. ABSTRACT NUMBER. No. 3.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

The organic chemistry of nitrogen, N. V. SIDGWICK (*Oxford, 1910, pp. X+415*).—This book had its origin in lectures given to the more advanced students at the University of Oxford, and while in no sense directly intended as a work of reference it gives an account of the present state of knowledge in those parts of this subject which are of great theoretical interest and may eventually have a practical bearing.

The chapters of the book are as follows: Compounds with no nitrogen directly attached to carbon—esters of nitrous and nitric acids; bodies containing one nitrogen atom attached to carbon—amins, aromatic amins, amids, derivatives of hydroxylamin, nitroso compounds, nitro compounds, carbonic acid derivatives, and cyanogen compounds; compounds containing an open chain of two or more nitrogen atoms—hydrazin derivatives, diazo compounds, azo compounds, azoxy compounds, nitramins, and derivatives of carbonic acid; compounds containing a chain of three or more nitrogen atoms—uric acid derivatives; and ring compounds.

Studies in the chlorophyll group.—V. Final proof of the identity of chlorophyllpyrrole and hemopyrrole, L. MARCHLEWSKI and L. BARABASS (*Biochem. Ztschr., 21 (1909), No. 6, pp. 548–550; abs. in Chem. Zentbl., 1909, II, p. 2171; Chem. Abs., 5 (1911), No. 5, p. 871*).—This work shows that hemopyrrole on condensation with benzenediazonium chlorid yields two azo dyes, which have the formulas $C_6H_5N_2C_8H_{11}NN_2C_6H_5HCl$ and $C_6H_5N_2C_8H_{11}NC_8H_{11}NN_2C_6H_5HCl$. Both of these are also yielded by chlorophyllpyrrole.

In regard to the nitrogenous substances of a nonprotein nature in the sugar beet, K. SMOLENSKI (*Ztschr. Ver. Deut. Zuckerindus., 1910, No. 659, II, pp. 1215–1261*).—The diffusion juices of a Russian sugar refinery were examined and found to contain the following nitrogenous but nonprotein bodies: Vernin, allantoin, asparagin, glutamin (?), and betain. No cholin nor tyrosin were present. Contrary to the statements which frequently appear, the author found that asparagin in an aqueous solution can increase the polarization, particularly when an excess of lead subacetate is employed. In concentrated alcoholic solutions, however, no increase in polarization could be noted. He points out that much more research will have to be done in order to establish whether asparagin or asparaginic acid is present in the beet itself, and also in regard to the optical properties of asparagin and asparaginic and glutaminic acids.

Note on the nitrogenous constituents of grape must, J. LEWIS (*Agr. Jour. Cape Good Hope, 37 (1910), No. 4, pp. 445–447*).—The ammoniacal and protein nitrogen contents of a number of varieties of grapes were determined. Both showed considerable variation during the growth of the fruit, especially when the fruit was immature and gradually becoming less when the fruit grew ripe. The amount of ammoniacal nitrogen, however, was subject to great variations, depending upon the place where the grape was grown and the variety of the fruit.

In regard to the chemical ripening processes of fruits, with particular reference to edible fruits, G. RITTER (*Deut. Obstbau Ztg., 1910, No. 31, pp. 429–435*).—A discussion in regard to the chemical processes involved, including general considerations in regard to the assimilation and respiration of fruits, the influence of air on the chemical ripening process, and the changes wrought as to water, proteins, carbohydrates, crude fiber, gums and pectin, fat and oily constituents, alkaloids, and acids during the ripening process, and with both early and late gathered fruits. The fruits considered are pears, blackberries, apples, cherries, plums, strawberries, raspberries, and currants.

Post-ripening of fruits, with particular regard to tannin, A. MANARESI and M. TONEGUTTI (*Staz. Sper. Agr. Ital., 43 (1910), No. 5, pp. 369–395*).—The fruits examined in this work were the medlar (*Mespilus germanica*), Italian service berry (*Pyrus domestica*), and Japanese persimmon (*Diospyros kaki*). The constituents determined were water, cellulose, sugar (invert), starch, ether extract, total nitrogen, protein nitrogen, ammoniacal nitrogen, total acidity, malic acid, acetic acid, alcohol, and tannic acid.

The results show that fruits which are mushy, or partially mushy, contain less tannin, malic acid, and sugar than properly matured fruits. Mature fruits contain less acetic acid and less alcohol. The other constituents were very variable.

Investigations in regard to the hellebore group, I, II, O. KELLER (*Arch. Pharm., 248 (1910), No. 6, pp. 463–467, 468–475; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 6 (1911), No. 2, pp. 63, 64*).—Helleborus, Aquilegia, Caltha, and Delphinium were examined for alkaloids.

It was found that no alkaloids are present in the roots of *Helleborus niger*, and probably not in *H. viridis*. In the roots of the former over 0.045 per cent of helleborin was found. *Aquilegia vulgaris* did not contain alkaloids in the blossoms nor in the foliage or seeds, while in the foliage of *Caltha palustris* small amounts of alkaloids were present. The chlorids and double salt of platinum of the alkaloids are crystalline. The alkaloid is not identical with nicotin.

In the seeds of *Delphinium consolida* the author found alkaloids, but not in the blossoms. The foliage was not examined. A description of the nature and properties of the alkaloids in the seeds is given in the second paper.

Is the action of rennet one of cleavage? E. COUVREUR (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 37, pp. 579, 580*).—Whey from milk which had been rapidly curdled and immediately treated with boric acid, filtered, and boiled with magnesium sulphate, did not show that rennet produces a cleavage of proteins. The xantho-proteic reaction present is probably an epiphenomenon.

A contribution to the knowledge of the oxidases and reductases of cow's milk, W. D. KOOPER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 9, pp. 564–575*).—It appears from this work that the catalase in whole milk can be separated with the cream and by either the centrifugal or the ordinary cooling method. When the milk becomes older the catalase content increases until the acidity of the milk reaches 40° to 50° (each degree corresponding to 1 cc. of tenth-normal alkali for every 100 cc. of milk), when it begins to decrease again. The catalytic power can be conferred on sterile whole milk if a little catalytic raw milk is added, and is capable of multiplying itself. According to the author, the catalase is probably of bacterial origin. It may be completely destroyed or weakened by the addition of various preservatives.

For reductase it was noted that the greater portion goes over into the cream when centrifugally separated, but that when separated by hand very much less passes over into the cream. Reductase multiplies more rapidly in skim milk than it does in whole milk, and according to this, this substrat in all probability is the best one to use when searching for reductase. The intensity of its action begins to rise until the acidity reaches 35° to 40°, then begins to fall, and later on begins to rise again. Its behavior toward antiseptics is the same as that of catalase. As the reductase increases to quite an extent when raw milk is added to boiled, the author concludes that it also is of bacterial origin.

Oxidase goes over into the skim milk irrespective of whether the creaming is done by the centrifuge or by hand, and when the milk becomes older no increase is noted. When the acidity degree rises to from 40 to 50 the blue color obtained with paraphenylendiamin begins to grow paler and diminishes until no reaction is obtained. This enzym (?) is not destroyed by a dose of corrosive sublimate which is lethal for fermentation organisms, and contrary to the findings with catalase and reductase indirect oxidase does not multiply when raw milk is added to boiled milk. According to this, the enzym is not of bacterial origin.

The author finally states that, although the test may be of value for food chemists and veterinarians, he doubts whether it will ever find a general introduction in the practical dairy industry.

The chemistry of honey formation, M. Küstenmacher (*Biochem. Ztschr.*, *30* (*1910*), *No. 3–4*, *pp. 237–254*, *pl. 1*, *fig. 1*).—After discussing the anatomy and physiology of the honeybee, the author details the chemistry involved in the transformation of nectar into honey.

In regard to the determination of nitrogen by the Kjeldahl method, A. C. Andersen (*Skand. Arch. Physiol.* *25* (*1911*), *No. 1–3*, *pp. 96–104*).—When determining nitrogen in platinic sal ammoniac with the Kjeldahl method the author observed that a great loss of nitrogen takes place. Some further experiments made with milk, blood serum, and fresh egg albumin showed that when using platinum as a catalyzer fairly good results could be obtained, while with urine, milk treated with pepsin or trypsin, old egg white, and hydrolyzed casein a large loss took place.

The author therefore does not recommend the use of platinic chlorid as a catalyzer in the method. He also points out that the formol titration method does not offer any advantages in point of time or exactness over the usual Kjeldahl distillation and titration method.

Estimation of total nitrogen by means of the formaldehyde titration method, L. de Jager (*Ztschr. Physiol. Chem.*, *67* (*1910*), *No. 1*, *pp. 1–7*; *abs. in Analyst*, *35* (*1910*), *No. 416*, *pp. 487*, *488*).—The substance is digested with sulphuric acid, as in the Kjeldahl process, and the ammonia formed is titrated in the presence of formaldehyde. The method as applied to urine is as follows:

"Phosphates are first removed by treating 40 cc. of the urine with 5 gm. of sodium acetate and an excess of 10 per cent ferric chlorid solution. The mixture is diluted to a volume of 50 cc., weighed, boiled, water added to correct for loss by evaporation, and the precipitate is removed by filtration. Ten cc. of the filtrate are now digested with 8 cc. of sulphuric acid and 0.5 gm. of copper sulphate, and the copper is subsequently removed as sulphid by the addition of 10 cc. of 10 per cent sodium sulphid solution, the excess of hydrogen sulphid being boiled off. The copper sulphid is collected on a filter, washed, and the filtrate is diluted to a volume of 100 cc. Fifty cc. of this solution (corresponding to 4 cc. of urine) are now neutralized with sodium hydroxid solution, using phenolphthalein as indicator, 6 cc. of neutralized formaldehyde solution are added, and the solution is titrated with tenth-normal sodium hydroxid solution."

A bacteriological method for determining available organic nitrogen, J. M. McCandless and F. C. Atkinson (*Amer. Fert., 34 (1911), No. 7, pp. 17, 18; Jour. Indus. and Engin. Chem., 3 (1911), No. 3, pp. 174, 175*).—The author describes a method similar to that proposed by Lipman (E. S. R., 23, p. 302), in which aqueous extracts of cottonseed meal and other organic nitrogenous fertilizers were shaken up with soil and incubated for 210 hours at from 38° to 40° C., and the rate of ammonia formation under these conditions determined.

Separation of calcium from magnesium, E. Murmann (*Ztschr. Analyt. Chem., 49 (1910), No. 11, pp. 688–698; abs. in Ztschr. Angew. Chem., 23 (1910), No. 47, p. 2229*).—According to the author an absolute separation of calcium from magnesium is possible only when enough sulphuric acid is present with 90 per cent alcohol to combine with or fix the calcium.

For conducting the separation the author adds a sufficient amount of titrated sulphuric acid to the solution of the chlorids and nitrates of calcium and magnesium to fix all the calcium, and after evaporating off the sulphuric acid aims to leave very little of the magnesium present as a sulphate. The residue is treated with 90 per cent alcohol, and the residual calcium sulphate filtered off, washed with the same strength alcohol, and treated in both an alkaline and acid solution to separate it from the magnesium which came down in the original precipitation as sulphate.

Precipitation of magnesium as ammonium magnesium arsenate, E. Raffa (*Gaz. Chim. Ital., 39 (1909), I, No. 2, pp. 154–162; abs. in Chem. Abs., 5 (1911), No. 5, p. 844*).—As the solubility of ammonium magnesium arsenate is about 0.037 part per 100 parts of water at 20° C, and 0.00303 to 0.00280 part per 100 in a mixture used for washing the precipitate and consisting of 1 part 10 per cent ammonia (NH_3) and 2 parts of water, the author proposes the use of the same procedure as described in previous work (E. S. R., 20, p. 1006). The precipitate is somewhat more soluble than the phosphate.

Titrametric determination of combined sulphuric acid by the barium chromate method, H. Roemer (*Ztschr. Analyt. Chem., 49 (1910), No. 8, pp. 490–492*).—The method is a modification of the Holliger method (E. S. R., 23, p. 214) and is as follows:

To the salt, which is dissolved in hot water containing some hydrochloric acid, add the requisite amount of one-half-normal barium chlorid solution, boil, titrate with an equivalent amount of standard solution of potassium bichromate (36.9 gm. per liter), add ammonium hydrate until the barium chromate separates, boil again, and filter off the barium sulphate and barium chromate. As the filtrate now contains an amount of chromate equivalent to the amount of sulphate originally present, it is titrated after acidifying with a few drops of sulphuric acid with ferrous ammonium sulphate, using potassium ferricyanid as an indicator. This method is good where amounts as low as 0.1 per cent of sulphuric acid (SO_3) are present.

In regard to the chemical analysis of moor soils and its value for cultural purposes, H. von Feilitzen (*Verhandl. Internat. Agrogeol. Konf. [Stockholm], 2 (1910), pp. 160–167*).—After reviewing the existing work on this subject, the author points out the advantage of utilizing for moor soils the extraction method which employs first a 4 per cent and then a 2 per cent hydrochloric acid solution for the purpose. A description of the method as used at the station of the Swedish Moor Culture Society is given, with a description of the method for interpreting the analytical results. For ordinary purposes quantitative analyses are made of the organic matter, the residue after calcination, and the calcium and nitrogen content, together with qualitative tests for substances injurious to plants, and the volume weight of the peat. At the same time a botanical, geological, macroscopical, and microscopical examination of the peat is made.

The determination of water and citrate-soluble phosphoric acid in superphosphates, H. Pellet (*Ann. Pharm. [Ranwez], 16 (1910), pp. 196–203; abs. in Bul. Sci. Pharmacol., 18 (1911), No. 3, pp. 186, 187*).—In estimating the citrate-soluble phosphoric acid the author believes it advisable to treat the phosphate with ammonium citrate upon a boiling water bath. The results are a little higher than those obtained with other methods.

Note on the determination of the free acid in superphosphates, F. B. Guthrie and A. A. Ramsay (*Jour. and Proc. Roy. Soc. N. S. Wales, 43 (1909), No. 1, pp. 69–74*).—During the course of experiments to determine the cause of the reduction of the germinating power of wheat when brought into contact with superphosphate before sowing, the authors made a comparative test of the various methods in vogue for the determination of free phosphoric acid in superphosphates. Those examined were the Glücksmann, Thomson, Gerhardt (E. S. R., 17, p. 111), Herzfelder (E. S. R., 15, p. 335), and the direct titration with sodium hydrate and utilizing various indicators.

From their work the authors conclude that none of these methods is satisfactory, and that although the Herzfelder method, which is based on the extraction of the phosphoric acid with ether and bringing it into an aqueous solution, utilizing methyl orange as the indicator, is the best, it yields only approximate results with phosphoric acid and is not neutral toward acid phosphate. They propose tentatively that a modification of the Herzfelder method be made to determine the free phosphoric acid in superphosphates, and that ether be used as the solvent for the free phosphoric acid, converting the ethereal solution into an aqueous one and titrating the free acid with a standard alkali solution, using sodium alizarin sulphonate as the indicator.

In regard to the analysis of Thomas slag powder, R. Woy (*Ztschr. Öffentl. Chem., 17 (1911), No. 5, pp. 86–88*).—The author discusses the advisability of eliminating some of the incongruous features of the Wagner method and simply determining all the citrate-soluble phosphorus that can be dissolved out of a given sample which has a definite degree of fineness without regard to temperature of solvent, number of times to be shaken or rotated, or length of time of exposure to solvent. He also points out the necessity of determining anew the strength of the solvent to be employed, and, furthermore, that the new method be made to serve also the purpose of detecting the presence of adulterants in slag powders. The possible value of the Dubbers method is also pointed out.

The present status in regard to the valuation of Thomas slag powders, R. Woy (*Ztschr. Öffentl. Chem., 16 (1910), No. 23, pp. 452–463; Chem. Ztg., 34 (1910), No. 118, pp. 1047, 1048*).—This is a critical discussion in regard to the methods in use for the valuation of Thomas slag powders, with some data in reference to the estimation of the citrate-soluble phosphoric acid according to the various citrate methods, when utilized under varying conditions and with particular reference to the silicic acid contained in the slag.

The behavior of the hairs of certain cereals with hydrochloric acid, L. Rosenthaler (*Ber. Deut. Pharm. Gesell., 20 (1910), No. 7, pp. 368–371, fig. 1; abs. in Chem. Ztg., 34 (1910), No. 145, Repert., p. 598*).—If the hairs at the tip of wheat are treated with concentrated hydrochloric acid (specific gravity 1.19) ribbon and spiral like forms spread from the hairs, or the hairs themselves curl up. This behavior could not be noted with the hairs from barley or rye, and therefore affords a means of distinguishing between these grains.

A new flour tester, H. Treml (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 3, pp. 196–198, fig. 1*).—A description of an improved apparatus for determining the color of flour.

Estimating the shell content of cocoa, A. Goske (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 10, pp. 642–643*).—A polemical article, in which the author claims that Filsinger and Böttlcher's findings (E. S. R., 24, p. 123) are based on certain misconceptions and errors.

About the resorcin test in honey examinations, M. Nyman and A. Wichmann (*Pharm. Zentralhalle, 51 (1910), No. 36, pp. 815–819*).—The resorcin-hydrochloric acid reaction is considered a good test for detecting the adulteration of honey with invert sugar.

In regard to the methods for examining marmalades and their composition, F. Härtel and J. Sölling (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 3, pp. 168–196, figs. 2*).—While the authors agree with Beythien and Simmich (E. S. R., 24, p. 308) in regard to the theoretical conclusions, they do not coincide with them in regard to the practical execution of the analytical methods. They therefore give the methods which they have found by many years of trial to be very efficient. The work considers the methods for estimating the insoluble and soluble portions of the marmalade, the sugar, sugar-free extract, starch sirup, total acidity, ash and ash alkalinity, and jellifying substances, and the microscopical examination.

The results of analyses for glucose, sucrose and starch sirup, commercial sugar and crude raspberry juice, commercial sugars, starch sirup and raspberry juice, plum marmalade with starch sirup, apple marmalades, and nearly 150 samples of commercial marmalades and fruit preparations are also given.

Depression of the freezing point by vinegars as a check on their composition, A. Silverman (*Jour. Indus. and Engin. Chem., 3 (1911), No. 3, pp. 173, 174, fig. 1*).—"In every case where the depression of the freezing point remained within the limits cited in the tables, the vinegar was found to analyze up to the required standard."

Detection of inositol for the identification of wine vinegars, P. Fleury (*Jour. Pharm. et Chem., 7. ser., 2 (1910), No. 6, pp. 264–266; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 19, p. 1174*).—The author proposes a test based on the finding of inositol in vinegar. Inositol is not decomposed during the acetous fermentation process.

Estimation of sulphurous acid in wine, L. Mathieu (*Ann. Falsif., 3 (1910), No. 24, pp. 410–417*).—The methods usually employed for determining free and combined sulphurous acid in wine are the Haas, Ripper, and Wartha. The Ripper method was found to give the highest results for both free and combined sulphurous acid, and in many instances this is more than the true amount of the acid present. This invalidates the method for samples which contain minimum amounts of free acid, but it can, however, be applied for total acid.

With the Haas method exact results can be obtained for both total and free acid, but only where the procedure for free acid is modified by oxidizing the sulphurous acid in the cold with iodin and titrating the excess of iodin with sodium arsenite. With the Wartha method danger exists from losses during condensation of the distillate and also loss of iodin.

[Detecting sulphured malt], O. Reinke (*Chem. Ztg., 34 (1910), No. 130, p. 1159, fig. 1; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 22, p. 1324*).—An aqueous extract of the malt is distilled with phosphoric acid in a current of carbon dioxid. The resulting sulphurous acid is absorbed in a solution of iodin, and the sulphuric acid produced is precipitated with barium chlorid. With this procedure it often happens that no precipitate is produced with barium chlorid, but when tested qualitatively with zinc and sulphuric acid, a dark brown stain is obtained upon lead acetate paper. This coloration is due to organic bodies.

To determine fusel oil in distilled liquors, H. P. Bassett (*Jour. Indus. and Engin. Chem., 2 (1910), No. 9, pp. 389, 390*).—This method is a modification of the Savelle method, and is as follows:

"To 25 cc. sample add 5 cc. of a normal alkali solution and digest for 1 hour on the water bath under a reflux condenser to saponify the esters, then connect with a suitable distilling apparatus and distill 25 cc.; add 5 cc. of water and distill an additional 5 cc. To this distillate add 0.2 gm. of *m*-phenylenediamin hydrochlorid and boil under a reflux condenser for 1 hour to remove the aldehydes, after which distill, collecting 25 cc.; add 5 cc. of water and distill an additional 5 cc., bringing the distillate up to the original volume. To this distillate add slowly an equal volume of [pure] H_2SO_4 concentrated, heat nearly to boiling, and while still hot add 5 to 10 drops of a 1:1000 solution of furfural; a pink or red color will develop in the presence of the higher alcohols, which may be compared with a standard solution of amyl alcohol treated in the same manner. By this method less than 0.01 per cent of fusel oil can be determined and 1 part in 20,000 detected."

The chemical and bacteriological methods for examining milk, G. Rühm (*Ztschr. Fleisch u. Milchhyg., 21 (1910), Nos. 1, pp. 14–19; 2, pp. 47–51; 3, pp. 78–83*).—This is a description and critical discussion of the various bacteriological and chemical methods for examining milk. Their value to the veterinary profession is particularly considered.

The control of the milk supply and milk examination, H. Lührig and L. Kressner (*Molk. Ztg. [Hildesheim], 25 (1911), No. 4, pp. 47–50*).—The authors point out that the value of the calcium chlorid serum test (E. S. R., 23, p. 309) is greatly dependent upon the system of milk control which is in vogue in the community where it is to be applied. They first discuss the various factors which influence the fat, etc., content of milk, and then give their results of a study made in regard to such influencing factors.

They report that sodium bicarbonate, borax, boracic acid, and sodium chromate, in concentrations ranging from 0.005 to 0.1 per cent in aqueous solutions, have no influence on the refraction. Formalin has an influence, as when over 0.3 cc. were present a slight increase in refraction could be noted, but not in the amounts in which it is employed as a milk preservative. Sodium bicarbonate did not even show an effect when 0.1 per cent was added. On the other hand, boracic acid, borax, and sodium chromate began to show their influence with concentrations ranging from 0.08 to 0.1 per cent. Salicylic acid when present shows itself as an additional refraction, and with as small an amount as 0.05 per cent in an aqueous or milk solution. It is used in this quantity as a preservative.

As a result of examining normal milks the authors found the greatest deviation in the morning milks to be 1.3 scale divisions, in afternoon milks 1.05 divisions, and in evening milks 1.5 scale divisions.

Examination of milk, E. Ackermann (*Abs. in Chem. Ztg., 34 (1910), No. 115, p. 1024*).—The author constructed an apparatus for preparing calcium chlorid milk serum, which will enable those who do not possess a refractometer to calculate the refractive index of a calcium chlorid milk serum from the specific gravity figure. A table for this purpose is appended. The author does not believe that this method can supplant the refractometer entirely.

The electrical conductivity of milk and the application of this principle for detecting the addition of water and the addition of electrolytes, R. Binaghi (*Rev. Gén. Lait, 8 (1910), No. 18, pp. 417–425; 8 (1911), No. 19, pp. 433–449*).—It appears from this work that an absolutely fresh and pure milk has a constant electrical conductivity. When the milk is watered the electrical conductivity diminishes. Sodium bicarbonate, sodium carbonate, borax, and boracic acid increase the conductivity, and in proportion to the amount of electrolytes added.

The method is described as easy and rapid of execution. The constants established for 36 samples of milk were the following: Sheep's, 49.43 to 51.72 (average $K_{25}=50.40\times10^{-4}$); goat's, 47.01 to 49.96 (average $K_{25}=49\times10^{-4}$); cow's, 47.97 to 49.78 (average $K_{25}=48.70\times10^{-4}$).

Table for obtaining the specific gravity of milk from the milk-ammonia mixture, W. D. Kooper (*Milchw. Zentbl., 6 (1910), No. 12, pp. 540–543*).—The specific gravity of curdled milk is determined by adding a definite amount of ammonium hydrate and determining the specific gravity of the liquid. The specific gravity of the original milk is found by the formula $S=\frac{(M+A)\cdot S'-A\cdot S''}{M}$; where S is the specific gravity of the milk, S′ the specific gravity of the milk-ammonia mixture, S″ the specific gravity of the ammonia, M the volume of milk in cubic centimeters, and A the volume of ammonia in cubic centimeters.

A table is appended for shortening some of the calculations involved. See also a previous note (E. S. R., 23, p. 308).

Testing for the calcium sucrate in sterilized milk and cream, W. Eichholz (*Milchw. Zentbl., 6 (1910), No. 12, pp. 536, 537*).—The author believes the best method to be the determination of the so-called lime residue figure, because the Cotton number as modified by Baier and Neumann (E. S. R., 21, p. 12) is unreliable.

Determination of fat in cheese by the hydrochloric acid method, H. Höft (*Chem. Ztg., 34 (1910), No. 150, pp. 1343, 1344*).—The comparative results obtained in these tests show that neither the concentration of the acid used, nor whether alcohol was employed or not, had any influence on the ultimate results. The cheeses examined were Tilsiter, Gouda, Edam, Camembert, Limburger, Romadour, and Wilstermarsch. See also previous notes (E. S. R., 6, pp. 15, 109; 16, p. 440; 24, p. 14).

The determination of sucrose in beet-sugar factory products by Clerget's process, using invertase as hydrolyst, J. P. Ogilvie (*Jour. Soc. Chem. Indus., 30 (1911), No. 2, pp. 62–64*).—After discussing the various sources of error with the method, particularly when the saccharine substance is improperly defecated, the author concludes that "if in determining the sucrose in beet molasses by Clerget's process invertase be used as hydrolyst, distinctly higher results are then obtained than with the ordinary Herzfeld modification in which concentrated hydrochloric acid is used as hydrolyst. But if in operating the Herzfeld process the error due to the influence of the optically active nonsugar substances be obviated by using the direct acid polarization instead of the usual alkaline (basic lead acetate) polarization, then the results do not differ appreciably from those obtained by means of invertase. From this the fact would appear to be established that invertase is a selective hydrolyst, inverting only the sucrose (and raffinose also, if present), without at all affecting the nonsugar bodies.

"The Pellet method of obviating the error due to the influence of the optically active nonsugars, by taking the direct polarization in a solution made acid by sulphurous acid, gives the same results as the method proposed by Andrlík and Staněk in which the concentrated hydrochloric acid and urea are used, besides having certain other apparent advantages. As a practical method, Pellet's sulphurous process is now recommended as preferable to the Andrlík and Staněk procedure, by reason of its greater ease of manipulation and several other apparent advantages."

Determination of cane sugar and raffinose, E. Saillard (*Ztschr. Ver. Deut. Zuckerindus., 1910, No. 659, II, pp. 1183–1194*).—This is a discussion of methods for this purpose, with particular reference to inversion constants and formulas.

The determination of raffinose, H. Pellet (*Ztschr. Ver. Deut. Zuckerindus., 1910, No. 659, II, pp. 1200–1204*).—The author points out the value of the Gunning method for estimating raffinose.

In regard to the presence of raffinose in raw beet sugar, L. J. de Whalley (*Ztschr. Ver. Deut. Zuckerindus., 1910, No. 659, II, pp. 1194–1198*).—The author points out that many crude beet sugars examined by him contained very appreciable amounts of raffinose. The formula employed for the purpose was Herzfeld's.

In regard to a uniform method for determining the dry substance in sugarhouse products with the immersion refractometer, V. Staněk (*Ztschr. Zuckerindus. Bohmen, 35 (1911), No. 4, pp. 187–204*).—For this work the author recalculated Wagner's tables to show the relation between the degrees on the refractometer scale and the percentage of dry substance in the sugarhouse product as weighed off, and with reference to this amount in 100 cc. of solution. The tables are given in detail, with another one for correcting the variations due to temperature. The method is described in full.

About the estimation of water in raw sugars by the immersion refractometer, V. Staněk (*Ztschr. Zuckerindus. Bohmen, 35 (1910), No. 2, pp. 57–64*).—The author states that this method is more convenient than the polarimetric method. He points out that where the criterions presented in the article are adhered to the limit of error between two tests will be 0.06 per cent of dry substance.

How sugar is tested, J. B. Baker (*Sci. Amer., 104 (1911), No. 10, p. 247, figs. 3*).—A general description of the use of the polariscope for testing sugars.

The influence which inactive substances have upon the rotation of levulose, N. Winder (*Biochem. Ztschr., 30 (1911), No. 5, pp. 357–373*).—The results show that the specific rotation of levulose is increased by inorganic acids and organic acids such as oxalic, while acetic acid, alkalis, alcohol, and acetone decrease it. Inorganic salts, such as sodium chlorid, sodium bromid, potassium iodid, and potassium bromid in certain cases increase it, and in others decrease it. No influence was exerted by slightly basic bodies.

In regard to the reaction ratio of aldehyde and keton sugars to Fehling's solution, E. Remy (*Apoth. Ztg., 25 (1910), No. 74, pp. 703–705; abs. in Ztschr. Angew. Chem., 23 (1910), No. 49, p. 2327*).—According to Fehling, a reduction relation of 1 : 5 exists between glucose and copper. According to Soxhlet, this is independent of the concentration and subject to slight variations. On the basis of the formula involved in the reaction products of these reductions, the author determined the ratio of glucose and fructose to cuprous oxid as 1 : 5.3 (fluctuating between 1 : 4.8 and 1 : 5.3), and for invert sugar, bioses, and cuprous oxid 1 : 10.6. The relation between pentoses (arabinose) and cuprous oxid is probably the same as the latter.

Staining of glycogens, P. Mayer (*Ztschr. Wiss. Mikros. u. Mikros. Tech., 26 (1910), No. 4, pp. 513–522; abs. in Chem. Abs., 5 (1911), No. 6, p. 1118*).—Resorcinol-fuchsin, cresol-fuchsin, and rosanilin hydrochlorid stain glycogens. The microscopic field has a granular appearance, the granules standing out boldly against a colorless background. Some further experiments with ammonium hydroxyferrigallate and iodin showed that the iodin preparation could not be made stable, but those with ammonium hydroxyferrigallate remained so for quite some time. Glycogen takes ammonium carminate, but the color is not definite enough to be utilized as an identification test.

The iodin reactions for starch, W. HARRISON (*Proc. Chem. Soc. London, 26 (1910), No. 376, pp. 252, 253; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 22, p. 1335; Chem. Ztg., 34 (1910), No. 142, p. 1264*).—From this work it appears that it is unnecessary to have an iodid present when conducting this test. In the presence of salts or some dilute acid, the blue color obtained in the reaction is decidedly darker. On adding alcohol to the solution it takes on a variety of transitory colors which range from violet to yellow, a reversion to the original color being brought about by adding water. By washing iodized starch with pure water, all the iodin can be removed, from which the author concludes that starch plays the rôle of a protective colloid. Under certain conditions it is possible to produce the reaction for dextrins and starch celluloses with starch, and the author believes that dextrins and starch celluloses are simply different colloidal states of starch, and do not represent different compounds.

An improved (Scherer) reaction for inosit, E. SALKOWSKI (*Ztschr. Physiol. Chem., 69 (1910), No. 6, pp. 478–481; abs. in Wchnschr. Brau., 28 (1911), No. 8, p. 95*).—A little of the inosit is placed upon a porcelain crucible cover, dissolved in from 1 to 2 drops of nitric acid (specific gravity 1.2), then 1 drop of a 10 per cent potassium chlorid solution and 1 drop of a 1 to 2 per cent platinic chlorid solution are added, and the solution carefully evaporated by blowing and rotating. Inosit gives a pink to a brick-red coloration.

Contribution to the biochemical detection of glucosids decomposable by emulsin, E. M. BOURQUELOT (*Pharm. Zentralhalle, 51 (1910), No. 47, pp. 1086–1089; abs. in Chem. Abs., 5 (1911), No. 5, pp. 967, 968*).—A discussion of new methods for studying the activity of emulsin. The glucosid employed was salicin.

Estimation of formic acid, A. F. JOSEPH (*Jour. Soc. Chem. Indus., 29 (1910), No. 20, pp. 1189, 1190; abs. in Chem. Abs., 5 (1911), No. 3, pp. 445, 446*).—The method is based on the oxidation of the acid or formate with bromin, and then estimating the amount of hydrobromic acid or bromid produced. This is referred back to formic acid.

Simple method for determining formaldehyde, F. HERRMANN (*Chem. Ztg., 35 (1911), No. 4, pp. 25, 26; abs. in Chem. Abs., 5 (1911), No. 6, pp. 1158, 1159*).—To a glass-stoppered 150 to 200 cc. Erlenmeyer flask, which contains from 4 to 4½ gm. of the formaldehyde solution, add about 3 gm. of ammonium chlorid, and then run in as quickly as possible amid shaking 25 cc. of double-normal sodium hydrate solution. After allowing the mixture to cool at room temperature, add 50 cc. of water which contains 4 drops of a 1 per cent methyl orange solution, and titrate back with a normal solution of sulphuric acid. The difference obtained between the two normal solutions represents the sodium hydrate consumed for the production of hexamethylamintetramin, and when multiplied by 0.06 represents the formaldehyde in grams in the sample. Where much acid is present in the formaldehyde a correction for the acid must be made by titrating with tenth-normal sodium hydrate and against phenolphthalein.

A method of determining free and combined oxalic acid in plants, W. D. McABEE (*Pure Products, 7 (1911), No. 3, p. 144*).—The method is as follows:

"Dry the substance, usually 150 gm., in a water oven, pulverize and extract with four 25 cc. portions of acidified alcohol (10 cc. concentrated hydrochloric acid to 90 cc. alcohol). In extracting, the alcohol should be poured over the substance, which is heated on the water bath, allowed to stand for half an hour, and filtered. The residue is then transferred from the paper and extracted three more times. Add 5 cc. dilute sulphuric acid to the combined extractions, evaporate to 50 cc. volume, and filter. Exactly neutralize with sodium hydroxid, make strongly acid with acetic acid, add calcium chlorid solution, let stand overnight, filter, ignite, and weigh as calcium oxid."

The determination of free sulphur in condimental feeds, stock tonics and conditioners, G. M. MACNIDER (*Jour. Indus. and Engin. Chem., 3 (1911), No. 1, pp. 43, 44, fig. 1; abs. in Chem. Abs., 5 (1911), No. 5, p. 930*).—The author utilizes for this purpose a special apparatus, which consists of a graduated tube 16.4 cm. long and 3 cm. in diameter, with a stopcock fused in the tube at about 5 cm. above the bottom. One gm. of the feed is placed in the tube, 50 cc. of carbon disulphid added, the tube stoppered, and shaken in a shaking machine for 5 hours. The tube is then allowed to stand over night and 20 cc. of the carbon disulphid extract is drawn off into a 450 cc. Erlenmeyer flask by way of the glass stopcock. The carbon disulphid in the Erlenmeyer flask is evaporated off, the residue dried in a water oven, and the residual sulphur taken up with sodium hydrate. The solution is diluted, the sulphur oxidized with a stream of chlorin, the solution then acidified, boiled to discharge free chlorin, filtered, and the sulphur determined as barium sulphate by precipitation.

The clinical detection of glucose in the urine of domestic animals, F. W. DOLZ (*Der klinische Nachweis von Traubenzucker im Harn der Haustiere. Inaug. Diss., Univ. Giessen, 1910, pp. 104; rev. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 6 (1911), No. 2, pp. 68, 69*).—A discussion in regard to the efficiency of the methods utilized for this purpose.

Estimation of nicotin in concentrated tobacco juices, H. ULEX (*Chem. Ztg., 35 (1911), No. 14, p. 121; abs. in Analyst, 36 (1911), No. 421, p. 143*).—Ten gm. of the sample are weighed out in a porcelain dish and diluted with from 1 to 3 cc. of water. A mixture of 1 part of soda lime and 5 parts of calcined gypsum is then mixed with the liquid in sufficient quantity to produce a coarse powder. This is ground in a mortar with gentle pressure, and is passed through a fine sieve with about 220 meshes per square centimeter. The particles remaining on the sieve are again ground with a little more of the mixture, and the process repeated until the whole has been sifted. In mixing the liquid with the soda lime, the quantity taken should be such that all tendency to heating is avoided.

The total mixture will now amount to about 50 gm.: the ammonia compounds will be decomposed and volatilized, and the free nicotin remain behind. The elimination of the ammonia is completed by exposing the powder over sulphuric acid in a desiccator for about an hour. The nicotin is then distilled in a current of steam, using a tin flask of about 3 liters' capacity. This is charged with 1.5 liters of water heated almost to boiling; the dry powder is then introduced quickly, together with from 3 to 4 gm. of potassium or sodium hydroxids and 4 gm. of paraffin wax to prevent frothing. The flask is connected with the condenser and 1 liter is rapidly distilled off. Distillation is then interrupted, and 1 liter of boiling water is added to the contents of the flask, a second liter of distillate being collected in a separate vessel. The nicotin in the distillates is determined by titration with half-normal hydrochloric acid, using litmus as an indicator.

The method, according to the author, gives good results, and no evaporation of nicotin takes place during the elimination of the ammonia in the manner described. While it appears to yield higher results than some of the methods depending on extraction, this, according to the author, is due to the incompleteness of the extraction, and not to a fault in the method described above.

Determination of nicotin in concentrated tobacco juices, J. SCHRÖDER (*Chem. Ztg., 35 (1911), No. 4, p. 30*).—In this work the author points out the discrepancies which occur when various methods are utilized for the determination of nicotin in tobacco extracts, sheep dips, etc.), and describes the Ulex method noted above, which gives decidedly higher results. He criticises the preference of Porchet and Regis (E. S. R., 22, p. 515) for the Toth method. See also a previous note (E. S. R., 25, p. 16).

In regard to the determination of nicotin in concentrated tobacco juices, R. KISSLING (*Chem. Ztg., 35 (1911), No. 22, p. 200*).—This is a criticism of the Ulex method, noted in the abstracts above. The author does not consider the method a good one.

Karite and its products, P. AMMANN (*Agr. Prat. Pays Chauds, 9 (1909), No. 81, pp. 450–459; 10 (1910), No. 82, pp. 50–62*).—After discussing the geographical distribution of the plant (*Batyrospermum parkii*) and the use of shea butter, the author gives the details of the manufacture of shea butter and the results of the analysis of the product as obtained by various methods and from various localities in the Sudan. The purification and transportation of the product are also considered.

Malt vinegar and maize vinegar, C. F. JURITZ (*Agr. Jour. Cape Good Hope, 37 (1910), No. 6, pp. 717–736*).—After describing the various standards set up for cider, malt, and maize vinegar in the United States, Great Britain, and Cape Colony, the author discusses the present status of malt vinegar in Cape Colony and utilizes the results of numerous analyses to illustrate the various points.

He concludes that "if the manufacture of maize vinegar is ever to become a large local industry, two alternatives are open, either (*a*) the use of maize grits must be studiously avoided in the general interest, lest the market be flooded with the products of fermentation of damaged rice—products which would be chemically indistinguishable from vinegar produced from maize grits, but would possess a sufficiently evident distinction from whole maize vinegar, or, (*b*) definite standards will have to be laid down by legislation, discriminating more clearly than at present between vinegar prepared from whole grain containing a certain proportion of phosphates and nitrogen, and vinegar made from more exclusively starchy materials like rice or maize grits."

Yeast cultures for the fermentation of fruit juices, H. J. ALWOOD (*Pure Products, 7 (1911), No. 1, pp. 16–22, fig. 1*).—In this article the author points out the advantages of utilizing pure cultures of yeast for preparing ciders and wines. The methods of preparing pure yeast cultures are described.

The use of chicory for producing alcohol, W. DONFELT (*Ztschr. Spiritusindus, 34 (1911), No. 8, p. 93*).—These tests with chicory (*Cichorium intybus*) show that this raw material can not be looked upon as a favorable source of alcohol.

Foreign varieties of tomato conserves (*Pure Products, 7 (1911), No. 3, pp. 133–136*).—This article discusses the manufacture of tomato puree, tomato catsup, English tomato sauce, tomato jam, tomato sirup, and whole tomato conserves. The products of the Romance countries are particularly considered.

Tomato-seed oil, P. ACCOMAZZO (*Indus. Chim., 10 (1910), pp. 360, 361; abs. Jour. Soc. Chem. Indus., 30 (1911), No. 2, p. 95*).—The manufacture of tomato preserves is an important industry in Italy, and the author discusses the question of utilizing the residue for the manufacture of tomato-seed oil.

According to statistics published by the Chamber of Commerce of Parma, in this province alone about 850,000 quintals (83,660 tons) of tomatoes are treated per annum, yielding, after the removal of water by simple pressing, or by utilizing waste heat available in the preserve factory, from 40,000 to 42,000 quintals, of which from 10,000 to 12,000 quintals correspond to skins and the remainder to seeds.

Special tests showed that tomato seeds yield 18 per cent of oil on cold pressing and 20 per cent by extraction. The oil has the specific gravity 0.920, saponification value 184, and iodin value 118. It has rather pronounced drying properties and would probably be useful as an ingredient of oil varnishes, and as a burning oil. See also previous notes (E. S. R., 24, p. 311).

Technology of impregnation, T. KOLLER (*Die Imprägnirungs-Technik. Vienna and Leipzic [1911], pp. XVI+442, figs. 45*).—After discussing the various materials used for impregnation, the author in this book describes in detail the impregnation of woods for the purpose of protecting against rotting, impregnation of miscellaneous materials for rendering them impervious to water, impregnation for the purpose of making certain commodities and miscellaneous articles fireproof, impregnation of fluids and gases, impregnating machinery, and special methods of impregnation.

METEOROLOGY—WATER.

Climatic influences in the economic development of Australia, E. VAN CLEEF (*Bul. Geogr. Soc. Philadelphia, 8 (1910), No. 4, pp. 1-26, dgms. 9, maps 3*).—The author shows that as regards climatic characteristics Australia is quite sharply divided into (1) a hot, dry, interior province, and (2) a more humid subtropical coastal province, and that distribution of population and agricultural production very closely coincide with these climatic divisions. The limited possibilities of reclamation by means of irrigation are especially emphasized and a very close relation between economic development and occurrence of droughts is pointed out.

In view of the fact that the mineral resources of the country are limited and manufacturing must therefore remain at a minimum, "the country must be absolutely dependent upon the soil. The soil is the prime factor in bringing returns to the people. The production from the soil is dependent upon the climate, especially where irrigation is impossible as it has practically proven to be in Australia. . . . The discovery of a method whereby irrigation may be possible will mean Australia's freedom from the destructive drought and will offer opportunities for continued progress, on a limited scale.

A short bibliography of the literature bearing upon this subject is given.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and C. M. DAMON (*Massachusetts Sta. Met. Buls 267, 268, pp. 4 each*).—Summaries are given of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during March and April, 1911. The data are briefly discussed in general notes on the weather of each month.

The disinfection of water, R. G. PERKINS (*Mo. Bul. Ohio Bd. Health, 1 (1911), No. 3, pp. 72-78*).—The more efficient methods for this purpose recently proposed are briefly described, and a short bibliography of the main sources of information regarding them is given.

Nonrelation of the natural ice supply to typhoid fever and dysentery, H. W. HILL (*Cold Storage and Ice Trade Jour., 40 (1910), No. 6, pp. 33-35*).—In this article the position is taken that the danger of transmission of these diseases by means of ice has been very greatly exaggerated.

The handling and utilization of sewage sludge, A. ELSNER (*Die Behandlung und Verwertung von Klärschlamm. Leipsic, 1910, pp. VIII+87, figs. 30*).—This pamphlet deals in a comprehensive way with the amount and character of sludge obtained in different processes of sewage disposal and with different methods of handling and using the sludge. A section is devoted to the use of sludge as a fertilizer, both in wet and dry condition, and in mixture with absorbent materials. This discussion is confined to statements regarding the experience at various places in the use of sludge as a fertilizer and does not pass upon the economy of this method of utilization.

Night soil—a valuable manure, G. K. KELKAR (*Dept. Agr. Bombay Bul. 34, 1909, pp. 12*).—Various methods of handling night soil are described, and experiments with poudrette prepared in different ways in comparison with barnyard manure, oil cake, and sewage effluents of different kinds are reported.

It is stated that "of all the systems employed for the manufacture of poudrette, the one in which the night soil and town sweepings are mixed with a top layer of earth for weighting down the whole mass appears to be the best suited for adoption by the municipalities where the question of disposing of both these substances in quantities is important."

Analyses of poudrettes prepared by different processes are reported, showing nitrogen varying from 0.8 to 1.68 per cent, phosphoric acid from 1.57 to 4.1 per cent, and potash from 2.22 to 5.33 per cent, with a moisture content ranging from 4.64 to 13.79 per cent.

In experiments on corn, sorghum, sugar cane, guinea grass, alfalfa, and other forage plants, poudrette proved more effective than barnyard manure. The residual effect of the poudrette was observed 10 years after application.

[Experiments with night soil], T. F. MAIN (*Ann. Rpt. Dept. Agr. Bombay, 1909-10, pp. 31, 32*).—Good results from direct applications of night soil to cotton and from its after effects on succeeding crops for 6 years are reported. It was more effective, prompt in action, and profitable than barnyard manure.

SOILS—FERTILIZERS.

A wax seal method for determining the lower limit of available soil moisture, L. J. BRIGGS and H. L. SHANTZ (*Bot. Gaz., 51 (1911), No. 3, pp. 210-219, figs. 2*).—The method proposed "consists in growing the plants in a small glass pot, evaporation from the soil surface being prevented by means of a seal of wax which is melted and flowed over the soil surface. In the case of monocotyledons, this wax seal can be applied immediately after planting the seeds, and the seedlings will grow readily through the wax, forming a perfect seal around the stems. In the case of dicotyledons, the wax, which is usually a mixture of paraffin and vaseline having a low melting point and low heat conductivity, can be melted and flowed around the stems of the seedlings without injury. During growth, the pots are kept immersed in a water bath to avoid condensation of the soil moisture on the pot walls."

The water in this bath is stirred constantly to keep the temperature uniform, and a temperature of about 70° and a relative humidity of about 85 per cent are maintained. The amount of water added to the soil at the beginning depends upon the texture and will vary from 5 per cent for sand to 30 per cent for clay. As soon as the plants show unmistakable signs of wilting the moisture in the soil in the pots is determined and this is taken as a measure of the nonavailable soil water.

Tests of the method with Kubanka wheat seedlings indicate that "the probable error of the mean of the determinations from 12 pots or more does not usually exceed 0.1 per cent of actual soil moisture, which is fully comparable to the accuracy with which the soil itself can be defined through its physical properties."

In these tests the mean nonavailable moisture was 2.59 per cent in fine sand, 0.66 per cent in fine sandy loam, and 16.3 per cent in clay loam. The method is stated to be particularly adapted to the study of transpiration.

Contributions to our knowledge of soil fertility, I, R. GREIG-SMITH (*Proc. Linn. Soc. N. S. Wales, 35 (1910), pt. 4, pp. 808-822B*).—In these investigations the author found, by means of cultures of *Bacillus prodigiosus* in soil extracts filtered through paper and porcelain filters, that bacteriotoxins were unquestionably present in the soils experimented with and that these either killed or restricted the growth of bacteria which had been added to the extracts.

Various solvents (carbon bisulphid, chloroform, and petroleum ether) extracted from garden soil a wax, or group of waxlike bodies, for which the name "agricere" is proposed. The results are summarized as follows:

"Water extracts from soil a substance which is filterable through porcelain, and which is toxic to bacteria.

"The toxicity is made evident by the retardation of growth, or by the destruction of the bacteria.

"The toxin is destroyed by heat, by sunlight, and by storage. It slowly disappears from air-dried soil, and rapidly decays in aqueous solution. It is not destroyed by salts, such as sodium chlorid, potassium, or magnesium sulphate.

"Soils vary in the amount of toxin they contain, good soils containing less, poor soils more.

"The particles of soil are covered or 'waterproofed' with soil wax or 'agricere,' which consists of a mixture of saponifiable and unsaponifiable bodies.

"The wax solvents (volatile disinfectants) alter the distribution of the agricere by carrying it to the surface of the soil, and causing it to be segregated on the points of the soil particles.

"With the removal of the 'waterproofing' the soil nutrients are more easily dissolved by soil water, and attacked by bacteria."

On the importance of humus bodies, II. H. Fischer (*Fuhling's Landw. Ztg., 60 (1911), No. 3, pp. 73–83*).—This article reviews the present knowledge regarding the composition and action of humus compounds in the soil, especially in their bearing upon bacterial activity.

The new science of the soil, W. H. Beal (*Sci. Amer., 104 (1911), No. 7, pp. 168, 169, 186, 187, figs. 6*).—This is a brief review of some of the more recent advances in chemical, physical, and bacteriological investigation of the soil.

The importance of soil maps to soil science and agriculture, E. Blanck (*Fühling's Landw. Ztg., 60 (1911), No. 4, pp. 121–145*).—This article reviews the development and present status of soil mapping, indicating its scientific and practical value.

Soils of New South Wales, III, H. I. Jensen (*Agr. Gaz. N. S. Wales, 22 (1911), No. 1, pp. 27–35*).—This article deals with the origin, classification, and composition of these soils and compares them with the north coast soils of New South Wales previously reported upon (E. S. R., 23, p. 521; 24, p. 618).

It is stated that owing to the higher rainfall of that region the north coast soils are relatively richer in organic matter and poorer in mineral plant foods than the south coast soils. The basalt soils, especially, are much leached and contain a low percentage of lime. The quality of the soils of both the northern and southern districts depends upon the geological formations from which they are derived, and diminish in productivity in the following order: Alluvial; basalt; diorite and basic (hornblendic) granite; shale and mudstone; phyllite, schist, and slate; acid (siliceous) granite; and sandstone.

The average composition of the north coast and south coast soils is given in the following table:

Average composition of north coast and south coast soils.

District.	Moisture	Volatile matter.	Nitrogen	Lime.	Potash.	Phosphoric acid.
	Per cent.	*Per cent*	*Per cent.*	*Per cent*	*Per cent.*	*Per cent*
129 South coast soils	5.18	10.36	0.086	0.231	0.217	0.125
294 North coast soils	6.29	13.18	.086	.256	.173	.178

The higher percentage of potash in the south coast soils is attributed to the predominance of granite in that region. The author believes that in order to interpret a soil analysis correctly, the position of the soil, its geological formation, and the climate of the district must be known.

The German moors and their agricultural importance, Tacke (*Illus. Landw. Ztg., 31 (1911), No. 16, pp. 143–146*).—This is a general discussion on the extent and agricultural possibilities of these lands, with a view to stimulating their reclamation.

Moor cultivation in Germany, Oliver (*Jour. Bd. Agr. [London], 17 (1911), No. 12, pp. 999–1002*).—This article deals briefly with the origin, composition, manuring, and management of upland and lowland moors in Germany, particularly in the region of Hamburg. Special emphasis is laid upon the use of moors as meadows.

The acid content of moor water, K. Endell (*Jour. Prakt. Chem., n. ser., 82 (1910), No. 19–21, pp. 414–422; abs. in Chem. Ztg., 35 (1911), No. 10, Repert., p. 37*).—Tests showed a decided acidity in the water from a number of moors. This acidity is attributed entirely to free carbon dioxid. The brown-colored humus colloids removed from the water by dialysis were not acid.

The improvement of marsh soils, Luedecke (*Ztschr. Landw. Kammer Schlesien, 15 (1911), Nos. 9, pp. 266–272; 10, pp. 300–306; 11, pp. 333–338*).—The author discusses the fertilizer constituents, agricultural value, and reclamation of these soils. He is of the opinion that stock farming, whereby much of the land could be sown to grass and clover, is the best use to make of the lands, and gives data showing the profits that may be obtained per acre under such a system of farming. Methods of cultivating and seeding are outlined.

How can the farmer maintain the fertility of the soil? C. G. Hopkins (*Bien. Rpt. Kans. Bd. Agr., 17 (1909–10), pp. 10–20*).—This article deals in a popular way with the cause and rate of depletion of soil fertility and the value and use of crop rotations and farm manures in improving soils.

The value of different crops as green manures, A. D. Hall (*Jour. Bd. Agr. [London], 17 (1911), No. 12, pp. 969–974*).—Attention is called to results of experiments at Rothamsted on heavy soils which do not agree with those of experiments at Woburn on light soils as to showing that mustard is more effective as a green manure for wheat than vetch. In the Rothamsted experiments the yield and nitrogen content of wheat were uniformly higher following crimson clover and vetch than after mustard or rape.

The fisheries and the guano industry of Peru, R. E. Coker (*U. S. Dept. Com. and Labor, Bur. Fisheries Bul. 28 (1908), pt. 1, pp. 333–365, pls. 6*).—The fisheries and the guano industry are discussed together in this article, as strictly the guano may be considered a fishery product, and it is impossible to separate the two in protective and regulative measures, which it is the main purpose of this article to discuss. The guano-producing birds are described, and the principles which should underlie regulations for the protection of the birds and the extraction of the guano are set forth.

Bat and bird guanos in India, I. H. Burkill (*Agr. Ledger, 1911, No. 1 (Anim. Prod. Ser., No. 3), pp. 1–9*).—The character, composition, extent, and exploitation of guano deposits in different parts of India are briefly discussed in this article. It is shown that the guanos are very variable in composition, but are generally comparatively rich in phosphoric acid and poor in potash and nitrogen. As a rule the deposits are too small in extent to be of any except local interest.

Report of experiments with nitrogenous manures, T. Milburn and R. C. Gaut (*County Council Lancaster, Ed. Com., Agr. Dept., Farmers' Bul. 20, pp.*

10).—Comparisons of ammonium sulphate, sodium nitrate, and commercial calcium cyanamid and calcium nitrate on oats, mangel-wurzels, and potatoes are reported, the results indicating that equal amounts of nitrogen supplied by these four nitrogenous fertilizers are equally effective for crop production. The calcium cyanamid is subject to the objections that it is very light, dusty, and troublesome to apply, and may cause injury to young and tender parts of plants. The calcium nitrate must be handled carefully on account of its moisture-absorbing property or it will become sticky and difficult to apply.

The utilization of the nitrogen of the air, C. Frenzel (In *Fortschritte der Naturwissenschaftlichen Forschung. Berlin and Vienna, 1911, vol. 2, pp. 193–272, figs. 17*).—Investigations and the development of industrial processes relating to the artificial fixation of the nitrogen of the air are fully reviewed, with bibliographies of the more important literature bearing upon different phases of the subject.

The preparation of nitric acid from the air by the Pauling process, J. Vanderpol (*Houille Blanche, 10* (*1911*), *p. 5; abs. in Metallurg. and Chem. Engin., 9* (*1911*), *No. 4, pp. 196–198, figs. 4; Ztschr. Elektrochem., 17* (*1911*), *No. 11, pp. 431–434, figs. 4*).—The installation and operation of this process at La Roche de Rame, France, are described. Nine 600-kilowatt furnaces are now in operation, but it is stated that the furnaces will be enlarged to 1,000-kilowatt capacity.

Use of cyanamid in France, D. B. Mason (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 90, pp. 264–266*).—This report refers to the steadily increasing use of calcium cyanamid in France and to tests of the material as a fertilizer for oats, wheat, corn, and potatoes. It is stated that the cyanamid used in France in 1909 and 1910 cost from $1.84 to $1.93 per hundred pounds, containing 15 per cent of nitrogen, but that the same material sold for a much lower price in Norway on account of the cheap water power available for its production in that country.

Results of fertilizer experiments with potassium silicate and like substances during 1910, Wein (*Deut. Landw. Presse, 38* (*1911*), *No. 25, pp. 291, 292*).—Plat experiments with different crops and at various places are reported, the conclusion being drawn from the results that the fertilizers of this character tested were very effective and gave good returns.

Investigations on the action of ground phonolite, W. Krüger et al. (*Mitt. Deut. Landw. Gesell., 26* (*1911*), *Nos. 10, pp. 111–115; 11, pp. 125–128; 12, pp. 146–148; Mitt. Herzogl. Anhalt. Vers. Stat., 1911, No. 48, pp. 19, pls. 2*).—As a result of a series of pot and field experiments with cereals, grass, potatoes, and beets the authors reached the general conclusion that ground phonolite is ineffective and expensive as compared with potash salts.

Fifty years of the German potash industry, P. Krische (*Chem. Indus.* [*Berlin*], *34* (*1911*), *No. 7, pp. 173–182*).—This is a review of the history and present status of this industry, noting especially the investigators who have contributed to the improvement of the industry and the firms now engaged in it.

The fertilizing value of certain phosphatic materials, A. Grégoire and J. Hendrick (*Ann. Gembloux, 21* (*1911*), *No. 4, pp. 166–183*).—Pot tests of two proprietary so-called precipitated mineral phosphates are reported, showing that these materials were much less effective as fertilizers than pure bicalcium phosphate. Moreover, they contained substances which render them unfit for use in feeding animals.

The production of phosphate rock in 1909, F. B. Van Horn (*U. S. Geol. Survey, Advance Chapter from Mineral Resources of the United States, Calendar Year 1909, pp. 7; abs. in Manfrs. Rec., 59* (*1911*), *No. 9, p. 54*).—It is stated that the total production of phosphate rock in the United States in 1909 was

2,330,152 long tons, valued at $10,772,120, as compared with 2,3[illegible] long tons, valued at $11,399,124, in 1908. There was an increase in production in Florida but decreases in South Carolina and especially in Tennessee. Arkansas, Idaho, Utah, and Wyoming were the only other States to produce phosphate rock in 1909. The total production from these States was 9,4[illegible] tons in 1909, as compared with 13,111 tons in 1908, a loss of 3,618 tons."

The gypsum industry in 1909, E. F. BURCHARD (*U. S. Geol. Survey, Advance Chapter from Mineral Resources of the United States, Calendar Year 1909, pp. 11*).—It is stated that 2,252,785 short tons of gypsum was mined in the United States in 1909, representing an increase of nearly 31 per cent over the production of 1908. Of this amount 49,581 tons was sold for use as land plaster, representing a decided increase in such use over that of the previous year. Gypsum was produced in 16 States and 2 Territories besides Alaska during 1909, the largest production being reported from New York, Michigan, and Iowa.

The rocks and waters of the Roman Campagna with respect to lime, G. DE ANGELIS D'OSSAT (*Atti R. Accad. Lincei Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), I, No. 4, pp. 259–266*).—This is an account of a study of the lime content of the rocks and waters of this region with reference to the rate of solubility of the calcium carbonate of the rocks in water under varying conditions.

Molasses as a fertilizer, G. N. MARTIN (*Internat. Sugar Jour., 13 (1911), No. 147, pp. 153–155*).—The author refers to experiments by himself and by Boname (E. S. R., 21, p. 724), indicating marked and profitable benefit from applications of from 400 to 600 gallons of molasses per acre in the furrows from 1 to 2 weeks before planting cane.

On the composition and fertilizing value of peat ash, H. VON FEILITZEN (*Mitt. Liv-Estländ. Bur. Landeskult., Jahrb. 1909–10, pp. 31–34*).—Analyses are reported which show variations in lime from 5.79 to 21.04 per cent, with an average of 13.26 per cent; in potash from 0.52 to 2.21 per cent, with an average of 1.16 per cent; and in phosphoric acid from 1.73 to 2.7 per cent, with an average of 2.3 per cent. The average of water-soluble potash was 0.25 per cent and of citric-acid-soluble phosphoric acid 0.96 per cent. It is stated that pot experiments, which, however, have not yet been completed, indicate that the potash and phosphoric acid of peat ashes do not have as great fertilizing value as the same constituents in Stassfurt salts and superphosphate.

[Fertilizing materials], F. V. DARBISHIRE and W. GOODWIN (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 201–207*).—Analyses of potassium phosphate, tortoise-shell dust and shavings, ammonium sulphate, bone manures, fish guano, shoddy, and sewage sludge are reported, with brief comments upon their fertilizing value.

Analysis of fertilizers sold in Maryland, H. B. MCDONNELL ET AL. (*Md. Agr. Col. Quart., 1911, No. 51, pp. 31*).—This bulletin reports analyses and valuations of fertilizers examined during September to December, 1910, inclusive.

Inspection of commercial fertilizers, P. F. TROWBRIDGE ET AL. (*Missouri Sta. Bul. 91, pp. 391–448*).—This report, made in accordance with the Missouri fertilizer law, covers the year ended December 31, 1910, and contains the text of the law, a statement regarding the purchase of fertilizers, a list of fertilizer manufacturers and brands offered for sale by them, a comparison of the valuation of fertilizers of the same guarantied composition, analyses of the fertilizers inspected, and a financial statement.

Analyses of fertilizers, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 32 (1911), No. 1, pp. 81*).—Analyses and valuations of fertilizers collected in North Carolina during the fall season of 1910 are reported, and a list of brands registered for the season of 1910–11 is given.

Commercial fertilizers, E. Fulmer (*Washington Sta. Bul. 98, pp. 24*).—This bulletin contains the text of the state fertilizer law, a statement regarding the use of fertilizers in Washington, explanations regarding the sources, character, and prices of fertilizing materials, and analyses and valuations of fertilizers inspected during 1910.

AGRICULTURAL BOTANY.

The water balance of succulent plants, D. T. MacDougal and Effie S. Spalding (*Carnegie Inst. Washington Pub. 141, pp. 77, pls. 8, dgms. 16*).—Attention is called to the fact that many plants have a capacity for absorbing and conducting water far in excess of the amount they give off, the flora of Arizona, Nevada, and Sonora being especially rich in forms which carry a large water balance. A series of observations covering several years has been made for the purpose of determining the amount of the balance, its variations, the factors influencing its volume, the relation of the various proportions of the balance to growth, and the reversible changes to which such plants are subject. The studies were made principally with the giant cactus (*Carnegiea gigantea*), bisnaga (*Echinocactus wislizeni*), and some of the common prickly pears (*Opuntia* spp.).

In the investigations on form alteration and growth of cacti, as shown by previous studies, it was found that the giant cactus not only possesses a structure remarkably fitted for the storage of a large quantity of water, but also, without the slightest interference with the efficiency of its mechanical system, adjusts itself by a change of form to the increased supply taken up from the soil after a rain, and to its diminution during subsequent periods of drought.

The observations in the present paper confirm those relating to the mechanical adjustment of the trunk of the giant cactus and show that insolation is a strong secondary factor operating in conjunction with the water supply and modifying its effects. Changes of air temperature were found to produce slight expansion and contraction of the trunk, but in most cases the minor changes were obscured by those caused by variations in soil moisture.

Discussing the growth of the giant cactus, or sahuaro, it is said that for a few years growth is apical, the increments of succeeding years increasing in diameter until the trunk attains the full thickness, which is afterwards maintained throughout life. The average yearly growth in height of individuals is between 10 and 12 cm., and from the data collected it appears that a giant cactus requires approximately 100 years to attain a height of 10 meters.

The percentage of water in the healthy sahuaro ranges from 75 per cent of the fresh weight in its lower part to more than 90 per cent in its upper part. A plant 6 meters high absorbed and stored approximately 412 liters of water between November, 1906, and March, 1907, in addition to the amount transpired. Transpiration from the trunk is slow, but is quite rapid from flowers and flower buds, the average transpiration of a fully opened flower being at least 850 mg. an hour in full sunlight.

Comparative studies with Echinocactus showed that its structural features are essentially the same for mechanical adjustment as those of the giant cactus. Some differences, however, are noted in mode of growth. In the Opuntia the mechanical adjustment is provided in a somewhat different way, the joint swelling or shrinking with the amount of water received or lost.

In discussing the water balance it is shown that these succulent plants can lose a large amount of the water contained in them without appreciable injury, practically all specimens surviving for a year after the water supply had been cut off. Weighings were made of a number of specimens, and after a rather rapid loss there followed a period of very slow loss of water. In addition to the mechanical adjustment to prevent loss of water there is some indication of an increasing acidity of the cell sap, which possibly aids materially in reducing transpiration, although the present investigation does not demonstrate such a relation.

A discussion of the water balance and its relation to desert flora is given.

A new method for estimating the gaseous exchanges of submerged plants, F. F. Blackman and A. M. Smith (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 565, pp. 374–388, figs. 2*).—A method is described for estimating the gaseous exchanges of submerged plants, which consists essentially of passing a continuous current of water containing dissolved carbon dioxid over the assimilating plant and determining the difference in the carbon dioxid content of the water before and after contact with the plant as a measure of the assimilation taking place.

On assimilation in submerged water plants, and its relation to the concentration of carbon dioxid and other factors, F. F. Blackman and A. M. Smith (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 565, pp. 389–412, dgms. 9*).—In a previous paper (E. S. R., 18, p. 923) it was shown that assimilation by green leaves was determined by the limiting factors of light, temperature, and carbon dioxid. In the present paper an account is given of a quantitative study of assimilation in submerged plants along similar lines, the studies being made with several species of aquatic plants with the apparatus described above.

The nature of the relation between assimilation and the environmental characters of carbon dioxid, light intensity, and temperature was found to be such that the magnitude of assimilation in every combination of the factors was determined by some one of them acting as the limiting factor. When so limited, an increase of that factor was found to bring about an increase in the magnitude of assimilation. As an example the authors found with constant light and temperature, but with increasing carbon dioxid content of the water, that photosynthesis increased up to a certain degree, beyond which there was a sudden drop unless more light or a higher temperature was employed.

Studies on the relation of the living cells to the transpiration and sap flow in Cyperus, II, J. B. Overton (*Bot. Gaz., 51 (1911), No. 2, pp. 102–120, figs. 2*).—In a previous paper (E. S. R., 24, p. 626) an account is given of the effect on transpiration of killing portions of stems with steam or hot wax, and in the present paper experiments are described with various poisons, the stems being killed with xylol, picric acid, alcohol, copper sulphate solution, corrosive sublimate, etc.

The experiments with the poisons show that the different kinds influence the subsequent rate of evaporation of water from the plants, and that in many cases the new rate far exceeds the normal transpiration of a plant of the same age and superficial area. It seems certain that in the case of plants poisoned throughout, the elevation of water in the stems and its evaporation from the leaves in larger quantities than normally occurs in living plants depend purely upon physical processes.

Summarizing the results of the different experiments the author shows that no matter how long the section killed by steam may be, the leaves never wither quite so quickly as those cut and not placed in water, but kept under the same conditions of light, temperature, and moisture. A certain amount of water is raised through the steamed portion, but it gradually diminishes until the leaves become air dry. Diminution in the water supply is partially due to a blocking of the vessels with a gumlike substance, which probably owes its origin to the disorganization of the contents of the sieve tubes caused by heating the stems.

The withering of the leaves is believed to be caused more by the action of the deleterious substances introduced into them from dead cells than from lack of water, and the leaves of rooted plants grown in nutrient solutions containing sterilized decoctions of the same plant droop in from three to five days, and become dry in from seven to eight days.

In experiments in which portions of the stems were killed with picric acid, alcohol, or copper sulphate, sufficient water was found to ascend through the poisoned portions to continue the transpiration for a comparatively long period and to allow the development of new branches. Picric and chromic acids and corrosive sublimate greatly accelerated the amount of water evaporated in poisoned plants.

A bibliography of literature cited is given.

The temperature coefficient of the duration of life of barley grains, T. H. Goodspeed (*Bot. Gaz., 51 (1911), No. 3, pp. 220–224*).—The temperature coefficient for the duration of the life of barley grains was determined by subjecting different lots of seed to temperatures varying from 55° to 70° C., after which the vitality of the seed was tested. The time in minutes required for a given temperature to act in order to inhibit subsequent growth was taken as the duration of life under the conditions of the experiment.

At a temperature of 55° from 65 to 70 minutes' exposure was required to destroy the germinative ability of barley seed. while at 70° an exposure of from 1½ to 2 minutes destroyed it. The average temperature coefficient for every degree centimeter was 1.27, or about 11 for a temperature interval of 10°.

The rôle of chlorophyll and light in the transformation of the carbon dioxid and aqueous vapor of the air, A. Dubosc (*Rev. Gén. Chim., 13 (1910), Nos. 15, pp. 268–270; 17, pp. 273–281; 18, pp. 295–303; 19, pp. 316–320; 21, pp. 331–335*).—A résumé is given of various opinions regarding the functions of chlorophyll and light in decomposing and transforming the carbon dioxid and aqueous vapor of the air, the author supplementing the published results of others by comments and observations of his own.

The respiratory energy of plants cultivated in different degrees of light, E. Rosé (*Rev. Gén. Bot., 22 (1910), No. 262, pp. 385–398, pl. 1*).—A study was made of the respiratory energy under different degrees of illumination of peas, representing plants accustomed to strong light, and of *Teucrium scorodonia*, a shade plant. The intensity of the respiration was found to vary with the different plants, with different degrees of illumination, and with different stages of growth for the same plant.

The portion of the spectrum influencing photosynthesis, P. A. Dangeard (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 5, pp. 277–279*).—By means of a Nernst lamp, which was used day and night for a period of two months, the author has studied the effect of different portions of the spectrum on the photosynthesis of an alga, *Chlorella* sp.

At the end of about eight days there was a distinct band of green growth, which occupied the principal absorption band of chlorophyll, and this corresponded to absorption band I of chlorophyll, which has a wave length of from 670, to 635, according to Jost. The spectrum of growth of the alga extended from the limits of the infra-red nearly to line H in the violet, all the rays occurring within these limits having a part in photosynthesis. Beyond this there was little activity except in the region of absorption bands II and III of chlorophyll.

Leaf decay and autumn tints, P. Q. Keegan (*Chem. News, 102 (1910), No. 2657, pp. 213, 214*).—In a previous communication the author called attention to the relation between the ash of leaves and their autumn tints. Subsequent study has shown a connection between the vitality of the leaves and their coloration, the connection apparently being through the albuminoid content of the leaves. An examination of a number of species showed that in some the quantity or ratio of the albuminoids of the leaf remains permanent from July until the time when the chlorophyll begins to disappear, while in others the ratio becomes gradually and permanently less with the advance of the season.

In general those leaves in which there is a marked reduction in the albuminoid content become red in autumn, while those in which the albuminoid content remains nearly constant are brown. Some exceptions are noted to this, particularly in the leaves of oak and beech, which are occasionally bright red, and this is explained by different physiological activity, there being a transfer of the albuminoid due to the prolonged vegetation of the tree. The relation between the red coloring and the albuminoid content suggests that there is probably a connection between the diminution of the albuminoid matter and the development of the vivid crimson or purple coloration.

The influence of acidity on germination, Mlle. G. Promsy (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 8, pp. 450–452; abs. in Rev. Sci. [Paris], 49 (1911), I, No. 9, p. 282*).—The author found that different acids not only increased the growth of various plants, some more rapidly than others, but also stimulated a greater production of dry matter, when determined at the end of germination after the plants had become green.

The organic acids, of which there were a number, are held to contribute to the nutrition of the plants. Germination was accelerated in proportion to the different organic acids used and the species of plant experimented upon. The author claims that the favorable action often attributed to bases can not be considered as due to the neutralization of the acid of the plant.

The use of solutions of potash to determine the germinative faculty of seeds, P. Lesage (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 10, pp. 615–617*).—The author describes a method for determining the germinative ability of seeds by placing them in solutions of caustic potash. Varying dilutions of a normal solution were used, and for different kinds of seed it was found that the strength of solution had to be varied.

Nonviable seed was found to discolor the solution within a few hours, while sound viable seed did not. This method was worked out for the seeds of cress, but it has been tested on a number of other kinds of seed and found to apply to many of them.

The effect of the activation of the atmosphere by radium emanations on the germination and growth of plants, G. Fabre (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 6, pp. 187, 188*).—The author reports the effect of radium emanations on the germination and development of *Sterigmatocystis nigra*, *Mucor mucedo*, and *Linum catharticum*.

With Sterigmatocystis the germination of the spores on acid gelatin was retarded by the emanation of radium of high potency. The optimum dose of one-half microcurie per cubic centimeter of air retarded germination for the first three days, but on the fourth day the growth equaled that of check cultures. With a double quantity the germination was greatly reduced and the growth of the mycelium was retarded. Similar results were obtained with Mucor.

The germination of seeds and development of the seedlings of Linum were favored by increasing emanations up to 1.5 microcuries for 2 liters of air. The growth was retarded by increasing the amount of emanation, and germination was retarded where it amounted to 40 microcuries per liter of air.

Nitrogen and chlorophyll in galls and etiolated leaves, M. Molliard (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 5, pp. 274–277*).—A study is reported of the nitrogen content of normal leaves and of galls formed by various insect parasites on a number of species of plants, in which it was found that the proportion of soluble nitrogen to total nitrogen increased in the abnormal growths due to the presence of the insects. An examination of etiolated leaves showed a similar condition, and attention is called to the possible correlation between the increase of soluble nitrogenous materials and the diminution of chlorophyll.

Some experiments on the utilization of ammonium salts by green plants, E. PANTANELLI and G. SEVERINI (*Staz. Sper. Agr. Ital., 43 (1910), No. 6, pp. 449–544*).—The authors review quite fully the work of other investigators on the comparative fertilizing value of different forms of nitrogen and the conditions which they produce in soils, and report the results of experiments on the utilization of different ammonium salts by green plants grown in sterilized liquid cultures, in sterilized soils of different structure and each having a different absorbing power, and in soils under normal crop conditions. The salts used were sodium nitrate (for comparison), ammonium tartrate, nitrate, sulphate, and chlorid, triammonium phosphate, and ammonium magnesium phosphate, while wheat, rice, mustard, corn, and flax were the plants used.

Detailed tabulated data are given of the resulting acidity or alkalinity of the culture media for the various ammonium salts used during the period of growth of the plants, both in the water and pot cultures. The amounts of organic, ammoniacal, and nitrate nitrogen obtained or used during the growing period of the plants are recorded. The general effects of each salt on the growth of the different plants are also noted.

It was found that in liquid cultures, under conditions in which nitrification was excluded, certain ammonium salts are able to act as a source of nitrogen food for green plants. A rapid absorption of the ammonium cation induces an acidification of the nutritive liquid, which reaches a maximum during the first period of growth for those salts of ammonium derived from strong acids, such as sulphuric, hydrochloric, nitric, and phosphoric acids. If the anion is absorbed rapidly, as is the case with the nitric and phosphoric anions, after the first week of growth the external acidity diminishes and the plants grow vigorously. By using an ammonium salt which is only slightly soluble, such as ammonium magnesium phosphate, this danger of acidification is avoided. Moreover, the absorption of the ammonium is thereby much decreased, giving the plant time to utilize it in the best possible manner for the production of organic substances and of albuminoids. Especially is this true of wheat, maize, and rice. In sterile soils where nitrification is excluded, the different salts of ammonium act differently under the influence of two principal factors, viz, the diverse absorbing power of the soil for the ammonia, and the presence of lime in the soil in sufficient quantities.

Briefly, the authors conclude that the inferiority usually attributed to ammonium sulphate as compared to nitrate of soda as a source of nitrogen results from irrational application to the soil or to crops to which it is not suited, and does not justify a general depreciation of ammonium salts as a source of nitrogen food for green plants; that ammoniacal nitrogen has a coefficient of utilization for the formation of organic nitrogenous compounds superior to that of nitrate nitrogen; and that the utilization of a salt of ammonium depends upon the relative rapidity of the absorption of its two ions.

Investigations on nitrogen assimilation in green leaves, R. OTTO and W. D. KOOPER (*Landw. Jahrb., 39 (1910), No. 6, pp. 999–1004*).—The author gives the results of experiments with the leaves of *Æsculus hippocastanum* as to their ability to fix free nitrogen.

Fresh leaves were cut from the plant and the stems placed in distilled water. Tests were then made for the nitrogen content of these leaves every morning and evening. It was found that instead of the evening tests showing a greater amount of nitrogen, they showed less than similar leaves tested in the morning. The conclusion is drawn, therefore, that the leaves of nonleguminous plants do not fix free nitrogen.

Comparative absorption of salts of barium, strontium, and calcium by living plants, H. COLIN and J. DE RUFZ DE LAVISON (*Rev. Gén. Bot., 22 (1910), No. 261, pp, 337–344*).—In a previous publication (E. S. R., 3, p. 328) the authors reported upon the localization of barium salts in the roots of peas grown in cultures which contained small quantities of barium. Subsequent studies have been made of strontium and calcium salts.

While almost no trace of barium was to be found in the stems, strontium occurred in small quantities and calcium abundantly, showing that the salts of the latter two alkaline metals can penetrate the roots of peas and be transferred to the stems and other organs, but not the salts of barium. The results were confirmed with other plants, as beans, lentils, lupines, maize, wheat, hyacinth, etc.

The excretion of mineral and organic substances by roots and water pores of plants, P. MAZÉ (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 8, pp. 452–456; abs. in Rev. Sci. [Paris], 49 (1911), I, No. 9, pp. 282, 283*).—The author shows by his experiments that roots return not only mineral matter but also organic substances to the soil. In a like manner inorganic substances are eliminated through the water pores of the leaves.

The water collected from the leaves was found to contain chlorids, sulphates of lime and magnesia, nitric acid, and ammonia. The elimination of the unused mineral matter by roots and leaves, it is said, determines the composition of the ash of plants, the absolute weight of which will be increased or diminished according to the absorption.

Reduction by roots, O. SCHREINER and M. X. SULLIVAN (*Bot. Gaz., 51 (1911), No. 2, pp. 121–130*).—A report is given of experiments on the reducing power of seedlings grown in soil or solutions. The experiments were made to determine the power of uninjured growing roots, especially of wheat, to reduce substances, with the purpose of seeing if, like the oxidative power, the reducing power would be found to play a significant part in soil fertility.

Studies were made with wheat seedlings grown in various solutions, showing that they were quickly decolorized, after which experiments were carried on with seedlings placed in starch iodid solution, sulphur, nitrates, sodium selenite, and sodium tellurite to test their reducing power.

The experiments showed conclusively that uninjured roots possess a reducing power which is stronger in young seedlings and diminishes as the seedlings become older. As judged by the quickness with which the deposit of selenium is made on the roots and the intensity of the deposit, the reducing power increases from the time of germination to the sixth or eighth day and then decreases. On the other hand, the oxidizing power of wheat seedlings is said to be less in the young seedlings, increasing with age.

A bibliography is appended.

Some investigations on the action of wind on plant growth, F. CAVARA (*Bul. Orto Bot. R. Univ. Napoli, 2 (1910), No. 4, pp. 505–512, pl. 1*).—The results are given of experiments on the effect of wind on the growth of *Iresine herbstii*, *Coleus hybridus*, *Aster chinensis*, *Zinnia violacea*, and *Sempervivum clusianum*.

It was found that in most instances the main axis of the stem was shortened and thickened, resulting in a closer leaf formation approaching to a rosette type of growth. This was especially noticeable in *C. hybridus* and *A. chinensis*.

The author, therefore, concludes that wind is one of the important factors in the development of plant formations or facies.

Plants and tobacco smoke, H. Molisch (*Umschau, 15 (1911), No. 13, pp. 259–264, figs. 5*).—A report is given of experiments conducted to test the effect of tobacco smoke on plants. Seeds of vetch, beans, peas, and pumpkins were sprouted and transferred to water cultures, after which they were placed under bell jars, and in one of each series a large amount of tobacco smoke was blown.

After six days the plants were examined. All those seedlings which had been kept in an atmosphere consisting largely of tobacco smoke and respired air were shorter, had thicker stems, and in many instances the plants were negatively geotropic. The injury is attributed to the tobacco smoke, which the author says contains nicotin, pyridin compounds, sulphureted hydrogen, etc.

The results are said to have an important bearing on plant growing in dwellings, restaurants, show windows, etc., where there is a possibility of injury due to illuminating gas, heated air, tobacco smoke, or other deleterious substances.

The comparative toxicity of vegetable volatile oils on plants, H. Coupin (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 9, pp. 529–531*).—The author reports upon a series of experiments with wheat seedlings which were confined under bell jars in atmospheres practically saturated with the vapor of a number of essential oils derived from various species of plants.

The great majority of the essential oils were somewhat injurious, about 20 either killing the plants outright or causing their death in a short time, while about an equal number caused injury to the extremity of the leaves. Only about a dozen kinds of essential oils were found to be uninjurious.

The use of saponin in the preparation of insecticides and fungicides, G. Gastine (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 9, pp. 532–534*).—Attention is called to the use of the powdered bark of quillaia, Sapindus, and other preparations from a number of species of plants in connection with fungicides and insecticides, the saponin contained in them tending to emulsify the preparations and causing better distribution.

For combating simultaneously aphids, scale insects, and the fungi causing fumagine, the author recommends a solution composed of water 10 liters, Sapindus powder 20 gm., neutral acetate of copper 100 gm., and crude oil or petroleum 200 cc.

Agricultural bacteriology, J. Percival (*London, 1910, pp. X+408, figs. 59*).—This is a textbook on bacteriology designed for students in agriculture, dairying, and horticulture, and for agriculturists and horticulturists generally who desire to study the causes and methods of control of many natural processes with which they come in contact daily. The work embodies the results of the author's experience in the scientific training of students, and deals with the fundamentals of bacteriology so far as the requirements of the farm and garden are concerned.

A bacteriological museum and bureau for the exchange of bacterial cultures at the American Museum of Natural History, New York, C. E. A. Winslow (*Abs. in Science, n. ser., 33 (1911), No. 849, p. 539*).—The department of public health at this museum has equipped a laboratory to serve as a central bureau for the preservation and distribution of bacterial cultures of both pathogenic and nonpathogenic organisms and particularly of types of new forms and varieties. The laboratory also plans to keep on file descriptions of bacterial species in print or arranged in the form of the standard card.

The proposed microbiological central station in Berlin, O. Rahn (*Abs. in Science, n. ser., 33 (1911), No. 849, p. 539*).—A review is given in this paper of efforts put forth in Germany to establish a central station for the investigation, preservation, and distribution of microbiological cultures.

Contributions to the cytology of the bacteria, C. C. Dobell (*Quart. Jour. Micros. Sci. [London], n. ser., 56 (1911), No. 223, pp. 395–506, pls. 4, fig. 1*).—After a general review of the literature on the cytology of the bacteria, in which the views of each investigator are briefly stated, together with the technique used, the author describes his own methods and gives the sources of his material, descriptions of the forms investigated, and the cytological results obtained from the studies.

The conclusion is reached that all bacteria which have been adequately investigated are, like all other protista, nucleate cells. The form of the nucleus is variable in different bacteria and in different periods of the life cycle of the same species, and may consist of a discreet system of granules (chromidia) of one or more relatively large aggregate masses of nuclear substance, of a system of irregularly branched or bent short strands, rods, or netwoks, or of a filament of varying configuration, and probably also may exist in the vesicular form characteristic of the nuclei of many plants, animals, and protists.

Nuclei equivalents and nuclei of Azotobacter chroococcum and its spore formation, E. Mencl (*Arch. Protistenk., 22 (1911), No. 1, pp. 1–18, pl. 1*).—After a general description of the material and methods used in his investigations, the author gives the results of a cytological study on the internal structure and spore formation of Azotobacter, in which a simple form of mitosis, nuclei or their equivalents, sporulation, and involution forms were observed and described.

On the mineral needs of Azotobacter, H. Kaserer (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 2, pp. 97–123*).—This is a more extended discussion of investigations by the author on this subject, including details as to methods used and data obtained in arriving at the results which were summarized in a previous paper (E. S. R., 24, p. 29).

Viability of Pseudomonas radicicola on ash-maltose agar, S. F. Edwards (*Abs. in Science, n. ser., 33 (1911), No. 849, pp. 543, 544*).—During the latter part of 1906 cultures of *P. radicicola* were isolated from the nodules of 19 hosts on ash-maltose-agar and then transferred to the same medium in Freudenreich flasks which were kept in a darkened cupboard at laboratory room temperature. In the autumn of 1910 plates were made from these old cultures with the result that in 15 of them the organism was still living. Pot tests in sterile sand, using seeds of alfalfa, red clover, peas, and beans were started, but only the peas were sufficiently developed at the time of writing to examine.

Of 6 noninoculated control plants, 3 showed no nodules, and 3 showed 1, 10, and 12 nodules, respectively, while the 6 inoculated plants showed 18, 33, 20, 25, 64, and 25 nodules, respectively. The work thus far shows that *P. radicicola* retains its virility as well as its vitality after considerable periods of time in stock cultures under laboratory conditions.

The influence of quartz sand upon microbial cultures, O. Rahn (*Abs. in Science, n. ser., 33 (1911), No. 849, p. 544*).—The object of this investigation was to study the influence of soils upon micro-organisms. The decomposition of liquid media was compared with that of the same liquid absorbed in quartz sand, and great differences were found. Aerobic processes were greatly increased and anaerobic processes much decreased when the liquid was mixed in sand in such proportions as to allow abundant aeration, but both processes were favored when just enough liquid was added to the sand to keep it entirely submerged.

Biochemical factors in the soil, M. X. Sullivan (*Abs. in Science, n. ser., 33 (1911), No. 849, p. 543*).—Attention is called to the fact that the soil is not an inert reservoir for plant food, but is the seat of physical, chemical, and vital activities, the biochemical factors being especially prominent. Numerous bodies which occur in soils arise either in the metabolic activities of micro-organisms or are left there after the decomposition of the plant and animal débris, and probably also as a result of root excretion or cell sloughing. Some of these substances are harmful, and others beneficial to crops. Fertilizers tend to modify the physiological functions of the micro-organisms by bringing about suitable conditions for their development, by stimulating or retarding their digestion of inert bodies, and by furthering their enzymotic functions.

Bacteria of frozen soil, H. J. Conn (*Abs. in Science, n. ser., 33 (1911), No. 849, p. 543*).—The author briefly summarizes the results of investigations on this subject carried on at Ithaca, N. Y., during 1909–10, which showed a remarkable increase in soil bacteria during the winter, the increase being from 7,000,000 per gram in November, 1909, to 33,000,000 in February, 1910, and from 8,000,000 in November, 1910, to 22,000,000 in December, 1910. The quantitative results have been previously reported (E. S. R., 24, p. 520), while the qualitative work, including the study of some 300 cultures, is here discussed.

It was found that certain organisms were present throughout the year, while others appeared only at times and showed a tendency to reappear at the same seasons another year, fall and winter showing the greatest diversity of types. Four groups of bacteria were studied, as follows: (1) Higher filamentous bacteria (Actinomyces); (2) rapid liquefiers producing spores, mostly of the *Bacillus subtilis* group; (3) rapid liquefiers without spores, all but one being Pseudomonas forms; (4) slow growers without spores, producing punctiform colonies, partly liquefiers and partly nonliquefiers. This last group is the one containing the bacteria which increase the most noticeably in the winter.

On methods of measuring the bacterial activity of cultivated soils, R. Perotti (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), I, No. 4, pp. 266–274, fig. 1*).—The author briefly reviews the methods of prominent investigators, especially Remy's, for determining ammonification, nitrification, denitrification, and nitrogen fixation in different soils, and concludes that Remy's methods as used by Barthel (E. S. R., 21, p. 528) for the study of soil bacteriology are probably the best.

Attention is called to the results obtained in measuring ammonification, nitrification, and dentrification in certain Italian soils (E. S. R., 24, p. 717), in which there was a marked difference between ammonification and nitrification produced by certain of these soils during the winter and summer seasons, being much greater during the month of February than in July. These experiments also showed a greater degree of nitrification for soils having 10.5 per cent of organic matter than soils containing only 8.8 per cent.

Studies in soil bacteriology.—II, Ammonification in soils and in solutions, F. L. Stevens, W. A. Withers, et al. (*North Carolina Sta. Rpt. 1909, pp. 119–128*).—Previously noted from another source (E. S. R., 21, p. 619).

Studies in soil bacteriology.—III, Concerning methods for determination of nitrifying and ammonifying powers of soils, F. L. Stevens and W. A. Withers (*North Carolina Sta. Rpt. 1909, pp. 129–144, dgms. 4*).—Previously noted from another source (E. S. R., 22, p. 427).

Bacteriological studies of the soils of the Truckee-Carson irrigation project [Fallon, Nev.], K. F. Kellerman and E. R. Allen (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 211, pp. 36, figs. 20*).—The results are given of experiments on the nitrifying and ammonifying power of soils at different depths, on the nitrification of samples in solution, on the relation of chlorids and sulphates to nitrification, and on denitrification. The relative number of bacteria in different soils were estimated, and detailed studies of soils typical of extensive areas reported. All studies were made of a 3-foot zone, keeping separate the samples of soils from different depths, and the results shown by a series of diagrams.

It was found that nitrifying, denitrifying, and ammonifying bacteria were well distributed and universally present in the soils of the Truckee-Carson irrigation project, and became physiologically active when favorable conditions for their development occurred. The lack of proper decay and humification of organic matter in many of the unproductive soils is due either to unfavorable bacterial conditions produced by certain physiological and chemical factors or to an unusual bacterial flora. The nitrifying bacteria in the soils of Fallon, Nev., are active at greater depths than in eastern soils, and seem to be unusually virile in solutions, although the data on these points are not conclusive.

In general, the conditions favor nitrification, which frequently becomes intense, while those favoring denitrification are rare.

Upon assimilation of atmospheric nitrogen by fungi, L. H. Pennington (*Bul. Torrey Bot. Club, 38 (1911), No. 3, pp. 135–139*).—The author gives the results of experiments on the fixation of nitrogen by Penicillium, *Aspergillus niger*, Alternaria, and 3 species of Fusarium, in which no evidence of any fixation of nitrogen by these plants was found. The author believes that some of the positive results obtained by certain investigators on the fixation of nitrogen by fungi are due to errors of observation and technique, or to the use of different species of fungi under the same name by different investigators, as it is very possible that some strains of fungi are able to fix nitrogen, while other very similar strains or varieties do not have this ability.

Experiments with cyanamid-decomposing bacteria, H. Kappen (*Centbl. Bakt. [etc.], 2. Abt., 24 (1909), No. 13–15, pp. 382–404; abs. in Bot. Centbl., 114 (1910), No. 43, pp. 432, 433*).—The author claims to have found 4 bacteria, which in lime nitrogen and cyanamid solutions are able to decompose the cyanamid.

It is further stated that neither carbon dioxid nor organic acids are able to change the cyanamid in culture solutions and in the soil. The favorable action of grape sugar on the decomposition of the cyanamids is not due to the influence of the decomposition products of this kind of sugar, but is attributed to a physiological action on the bacteria.

It was also found that 2 fungi, Cladosporium and *Penicillium brevicaule*, played a part in the decomposition of the cyanamid.

The clogging of drain tile by roots, G. E. Stone (*Torreya, 11 (1911), No. 3, pp. 51–55, fig. 1*).—An account is given of the clogging of a 12-inch drain tile by the roots of a pear tree, a single root having penetrated the tile. From its cross section the root was apparently 5 years old. The tile was clogged to a distance of 61 feet. The principal roots removed were measured and the others estimated, from which it appeared that there was a total length of roots amounting to 8,498 feet in the section of tile removed.

The mycoplasm theory and metachromatic corpuscles, J. Beauverie (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 10, pp. 612–615*).—In a study of cross sections of young rust sori on wheat leaves, the author found many nucleus-like bodies not only in the fungus hyphæ, but also in the neighboring cells of the host. These bodies when stained with certain anilin dyes changed from blue to violet, and are called metachromatic bodies. The author, therefore, claims that the nuclei of the so-called mycoplasm of Eriksson are nothing more than these metacromatic bodies.

Variation of fungi due to environment, F. L. Stevens and J. G. Hall (*North Carolina Sta. Rpt. 1909, pp. 47–71, figs. 37*).—Previously noted from other sources (E. S. R., 21, pp. 33, 626).

A quantitative study of variation, natural and induced, in pure lines of Silene noctiflora, E. P. HUMBERT (*Ztschr. Induktive Abstam. u. Vererbungslehre, 4 (1911), No. 3–4, pp. 161–226, figs. 11*).—A study is reported of three generations of a pure line of *S. noctiflora*, about 7,500 plants being measured for height, width, and number of branches and seed pods per plant. The investigations included studies of the influence of chemical injections on variation, effectiveness of selection in pure lines, bud variation, and the influence of food supply on variation.

So far as the author's experiments go, it appears that the injection of chemical stimulants in the developing ovary did not produce mutations, although such injections did produce in many instances a marked increase in the variability of the species.

In his study of the effectiveness of the selection in pure lines, little evidence was found of the inheritance of the characters of height, number of branches, or number of seed pods. Some variation was noted, but not enough to warrant the description of mutants.

In considering bud variation, in the cases studied the buds were found to vary almost as much on single plants as they did on different individuals.

In studying the influence of food supply on variation it was found that good soil gave less variability and a greater correlation of characters than did poor soil. Other factors, as moisture, temperature, and physical condition of the soil, probably had some influence, but under the conditions of the experiments an increase in food supply decreased rather than increased variability in *S. noctiflora*.

On inheritance of a mutation in the common foxglove, EDITH R. SAUNDERS (*New Phytol., 10 (1911), No. 1–2, pp. 47–63, pl. 1, figs. 12*).—A description is given of inheritance observed in a form of the foxglove to which the name *Digitalis purpurea heptandra* is given.

This form of the plant is characterized by the splitting and staminody of the corolla, and these characteristic features appeared to be transmitted by heptandrous plants to all their offspring. The degree in which these peculiarities were exhibited varied not only among the individuals of a pure-bred family, but also among the flowers of single individuals. There is said to be some indication that the degree of heptandry exhibited may be influenced by external conditions, among which, variations in amount of light and moisture are probably to be considered. *D. purpurea heptandra* was found to behave in respect to the type as recessive to dominant.

Seeds and plants imported during the period from January 1 to March 31, 1910.—Inventory No. 22 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 207, pp. 100*).—This inventory is a report on 1,010 introductions by the Office of Foreign Seed and Plant Introduction during the period indicated. In addition to a considerable amount of material received from miscellaneous collectors, it also lists a large number of species secured from the Caucasus by F. N. Meyer, agricultural explorer.

Seeds and plants imported during the period from April 1 to June 30, 1910.—Inventory No. 23 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 208, pp. 88*).—This inventory contains accounts of material collected by F. N. Meyer in the Caucasus, together with a large number of plants obtained through various sources, a total of 844 introductions being listed.

FIELD CROPS.

Experimental work [with field crops] (*Oreg. Agr. Col. Bul., 1. ser., 1911, No. 48, pp. 5-27, 35, 36, 38-40, figs. 16*).—Work at the eastern Oregon substation is here reported.

In a test of 6 varieties Sixty Day and Shadeland Challenge oats yielded 41.68 and 38.40 bushels per acre, respectively. Among 8 varieties tested during the period 1907-1909 the 3-year average yields of Improved American and Silver Mine were 83.85 and 77.52 bushels per acre, respectively.

In a test of 12 barley varieties Beardless and Getekoun produced the highest yields of 56.45 and 41.47 bushels per acre, respectively. In a much more extensive test it was observed that the dark-colored barleys were the heaviest yielders, and "that 30-8, 30-18, and 30-24 are probably the most promising." The comparative yields of 50 of the station's new hybrid barleys are graphically indicated.

Alaska and durum wheat under field conditions yielded 16.86 and 14.94 bushels per acre, respectively. The station has produced a hybrid which unites the high yielding qualities of Fortyfold and the nonshattering qualities of Little Club besides giving the milling test desired.

In a field test of 5 varieties of field peas White Marrowfat produced the highest yield of 13.39 bushels per acre and was regarded as a promising variety. In another test of 55 varieties, conducted in cooperation with this department, Brown B produced the highest yield.

The Half Sugar mangel yielded 25.09 tons of roots and 5.59 tons of tops per acre, while clover yielded nearly 2 tons of hay, 228.94 pounds of seed, and over 1½ tons of straw per acre, with a total estimated value of $60.13 per acre. Dwarf Essex rape proved less hardy than kale, and the latter yielded 42 tons of summer forage per acre in a field test. A field test of seed flax produced an unsatisfactory yield of 11.92 bushels per acre.

In attempts to control mustard in oats the field sprayed with iron sulphate yielded 38 bushels per acre as compared with 42.86 bushels on the untreated field, and 42.25 bushels on a field cultivated by a weeder, which thoroughly stirred the surface soil without apparent injury to the grain. The yield of mustard seed per acre was 12.65, 26.05, and 22.11 bushels per acre, respectively, after the 3 treatments.

In a test of 20 varieties of potatoes Nohoot produced the highest yield of 252.73 bushels per acre. In a test of 10 varieties Salina Burbank potato produced the maximum yield of 258.8 bushels per acre. Three varieties of field corn failed to mature ears, but Yellow Dent matured about a dozen ears.

Summary of five years' results of cooperative tests of varieties of corn, wheat, oats, soy beans, and cowpeas, 1906-1910, A. T. WIANCKO and C. O. CROMER (*Indiana Sta. Bul. 149, pp. 3-23, fig. 1*).—This bulletin summarizes the results of the variety tests previously noted (E. S. R., 22, p. 725), and reports the results secured in 1910, the yields being reported by sections of the State numbered as in former years. Brief descriptions are given of the varieties tested for two or more years, and the summaries include the results obtained in 3,731 tests covering various seasons and every soil type represented in the State.

The table following presents the highest yields secured in each of the geographical sections.

Yields of the most productive varieties of field crops in 1910 in tests in various sections of Indiana.

Section.	Crop.	Variety.	Yield.
			Bushels.
1	Corn	Wabash Yellow Dent	46.4
2	do	Silver Mine	57.5
3	do	Reid Yellow Dent	51.7
4	do	do	58.8
5	do	Boone County White	62.2
6	do	Leaming	64.9
7	do	Boone County White	69.6
8	do	do	49.4
9	do	Johnson County White Dent	64.4
10	do	Alexander Gold Standard	52.4
11	do	Johnson County White Dent	50.4
12	do	Pride of Indiana	48.8
	Oats	Great American	45.9
Northern Indiana	Soy beans	Hollybrook	21.4
Southern Indiana	do	Medium Early Yellow	14.1
Northern Indiana	Cowpeas	Whippoorwill	18.9
Southern Indiana	do	Early Blackeye	11.1

Report on the Partabgarh Agricultural Station for the year ending June 30, 1910, S. M. HADI (*Rpt. Partabgarh Agr. Sta. United Prov. Agra and Oudh, 1910, pp. 8*).—Meteorological data and analyses of the station's soil and subsoil are followed by reports of variety and other tests of rice, corn, sugar cane, and wheat.

Progress of grain investigations, C. WILLIS and M. CHAMPLIN (*South Dakota Sta. Bul. 124, pp. 20–55, chart 1*).—A progress report of cooperative experiments conducted by the South Dakota Station and this Department at the Highmore, Eureka, and Cottonwood substations. Seasonal conditions and the methods pursued are stated and the Eureka and Cottonwood substations briefly described. Tables report the yields of common wheat, durum wheat, emmer, oats, barley, millet, and grain sorghums for the year 1909, the comparative results of ordinary and improved methods of growing grains in 1910, and the average yields secured in five-year variety tests. The improved methods used consisted in carefully grading pure seed, planting it in rows in 1909, grading the seed thus obtained, and planting the best in 1–100 acre plats in 1910 on land that had been in cultivated alfalfa rows during 1908 and 1909.

The author states that recent analyses "show that northwestern Velvet Chaff has improved as regards quality of gluten and percentage of patent flour so that the discrepancy in milling value may not affect the market price much in the future." The Beardless Fife wheats graded as well as Blue Stem and ripened two or three days earlier. In a variety test of 14 wheats Manchuria No. 2492 produced the highest yield of 21.2 bushels per acre. It was also the earliest variety in the test. Of durum wheats the Kubanka types appeared best suited to central South Dakota conditions.

Because of the variable seasons an early and a late variety of oats, Sixty Day or Kherson and Swedish Select, are recommended to South Dakota farmers.

In a test of 14 Foxtail and Proso millets, Kursk No. 78, a variety introduced from Russia, produced the heaviest yield of forage, but the common variety seeded more heavily. Milo maize, Kafir corn, and the durras will not mature seed with certainty under South Dakota conditions, but selections are being made in the hope of securing strains that will mature during the short seasons. The kowliangs matured seed of excellent quality in 114 to 115 days in 1909 and 1910. New breaking, brome grass sod, and corn ground proved successful as preparations for flax, but after fall-plowed wheat this crop was a failure because of flax wilt.

In the five-year variety tests Kubanka wheat Nos. 1516 and 1354 yielded 22.7 and 22.5 bushels per acre, respectively, as compared with 14.9 bushels each Bearded Red Fife and Minnesota No. 51 Blue Stem. The five-year average yields of Swedish Select No. 134 and Kherson No. 539 were 35.4 and 33.9 bushels per acre in a test of 14 oat varieties. Hannchen No. 531 and Bohemian No. 27 produced five-year average yields of 28.4 and 27.5 bushels per acre, respectively, in a test of 10 barley varieties.

Lucern, J. E. O'Grady (*Dept. Agr. N. S. Wales, Farmers' Bul. 37, pp. 118, pl. 1, figs. 48*).—This bulletin is a compilation of articles dealing with the production and utilization of crops of lucern or alfalfa.

The history of the clover-seed traffic in Vermont, Alma L. Carpenter (*Vt. Agr. Bul. 3, 1909, pp. 28*).—The author deals with the sources of clover seed used in America, clover-seed production in Vermont, and the clover-seed industry in the United States.

Some facts concerning those characters of the corn plant associated with yield and factors which influence them, C. B. Williams and W. C. Etheridge (*North Carolina Sta. Rpt. 1909, pp. 41–46*).—Six years' variety tests indicate "that the prolificacy of stalks in ears should be given prime consideration in selecting corn." Sanders Improved, a fairly prolific variety, produced a five-year average yield 6.8 bushels per acre higher than did Holt Strawberry, a good one-eared variety. Biggs Seven-ear, another prolific variety, produced a three-year average yield 4.4 bushels higher than that of Holt Strawberry.

Studies of shelling percentage indicate that a given variety may have a seasonal variation of 2 to 4 per cent or more, but that the best yielding varieties average from 80 to 87 per cent of grain.

The author presents in detail data from which he draws conclusions on the effect of different rates of planting and fertilizing upon yield, size of ears, height of ears and stalks, maturity, stand, production of suckers, and barrenness. Under poor fertilization there was practically no difference in yield between a spacing of 20 and 30 inches of the hills in the rows, but increasing the productivity of the soil by liberal fertilization "was accompanied by materially increased yields, over 30-inch spacing, by thinning the stalks to 20 inches."

On highly manured plats the stalks 30 inches apart produced the largest and longest ears, but gave lower yields than the 20-inch spacing. High fertilization and increased distance between hills increased the length and circumference of the ears of from two-thirds to three-fourths of the varieties tested. When plant food was limited in quantity the increase from 20 to 30 inches in distance between stalks in 4-foot rows was followed by the production of taller stalks and of ears attached farther from the ground, whereas the reverse followed on the same soil fairly well fertilized. An increase in either soil fertility or distance between hills resulted in a larger number of ears per stalk and a marked increase in the yield of shelled corn per bearing stalk.

Variation in the rate of planting produced no apparent difference in the extent of growth of the plants up to the time of tasseling and silking, but the closer spacing appeared to delay maturity about one day. The higher fertilization was followed by the production of suckers on 9.48 and 6.13 per cent, respectively, of the stalks planted 30 and 20 inches apart in the rows, while on poorly fertilized plats the percentages were 6.15 and 2.87, respectively. Barrenness was apparently decreased by either increasing the distance between hills or heavier fertilization.

Corn production, M. V. Calvin (*Georgia Sta. Bul. 93, pp. 147–154, fig. 1*).—During 1907, 1908, and 1909 Marlboro Prolific and Stone Flint were among the three varieties producing the highest yields in variety tests. In 1910 Wanamaker Marlboro, Sanders Improved, and Batt 4-Ear produced the highest yields, 36.15, 36, and 35.88 bushels per acre, respectively. The 15 varieties tested averaged 31.74 bushels per acre. A measured acre given special attention yielded 80 bushels of shelled corn, 800 pounds pulled fodder, and 1,320 pounds topped plants.

In a nitrogen test a basic formula was supplemented by different fertilizers in quantities that furnished the same amount of nitrogen each. The cotton meal, nitrate of soda, and sulphate of ammonia plats yielded 42.1, 43.04, and 44.46 bushels of shelled corn per acre, respectively, as compared with 37.22 bushels yielded by the no-fertilizer plats. On land previously sown to oats, then to cowpeas, applications of the same basic formula were followed by yields of 38.36 and 38.79 bushels of shelled corn per acre, respectively, when supplemented by cotton meal and tankage. A half cotton meal and half tankage addition to the basic formula yielded 40.57 bushels per acre.

Seed from the butts, tips, and middles of the ears yielded 35.22, 36.7, and 32.92 bushels per acre, respectively. Two stalks per hill yielded 56.16 bushels per acre as compared with 42.21 bushels when only one stalk was planted per hill. The Williamson method produced in a three-year test an average of 32.62 bushels as compared with 34.18 bushels obtained by the ordinary method. The cultural and other methods used in each of these experiments are stated in full.

Cotton, É. DE WILDEMAN ET AL. (*Rev. Écon. Internat., 8 (1911), II, No. 1, pp. 215*).—A series of articles by different authors on the following subjects: The uses of the cotton plant and its improvement, the culture of cotton in the various countries of the world, the world's production and consumption of cotton, the cotton industry and the periodical crises of overproduction, the International Federation of Cotton Spinner's and Manufacturer's Associations, financial affairs with reference to the industry, the history of inventions used in cotton culture and manufacture, and the history of cotton transportation.

Report on the present position of cotton cultivation, W. R. DUNSTAN (*London: Internat. Assoc. Trop. Agr. and Colon. Development, 1910, pp. 58*).—Summaries are given of reports on cotton cultivation in the cotton-producing countries or colonies of the world.

Cotton production, M. V. CALVIN (*Georgia Sta. Bul. 94, pp. 159–164*).—In a test of 33 cotton varieties averaging 1,894 pounds of seed cotton per acre McElhenny Cleveland and J. R. Cleveland Improved produced the highest yields, 2,256 and 2,206 pounds per acre.

In a nitrogen test cotton meal, nitrate of soda, and sulphate of ammonia plats yielded 1,246.18, 1,269.72, and 1,297.94 pounds of seed cotton per acre, respectively, as compared with 963.04 pounds on the no-fertilizer plats. This is a repetition of an experiment conducted the previous year (E. S. R., 22, p. 635).

Applications of 33 pounds of muriate of potash and 132 pounds of kainit in mixtures otherwise identical were followed by yields of 1,671.29 and 1,603.76 pounds of seed cotton per acre as compared with 1,330.68 pounds on the no-fertilizer plats. In another test applications of cotton meal and tankage were followed by yields of 1,824.47 and 1,873.04 pounds of seed cotton per acre as compared with 1,867.32 pounds after a mixture of the two materials, and 1,647.88 pounds on the nonfertilized plats.

The cultural and other methods used in each of these experiments are stated in full.

Effect of different fertilizing materials upon the maturity of cotton, C. B. WILLIAMS (*North Carolina Sta. Rpt. 1909, pp. 37–40*).—In about 30 tests of fertilizing materials combined in different proportions and applied in different quantities a hastening of maturity was invariably observed, and in most cases the greater the yield the greater was the percentage of the total crop which was obtained at the first two pickings. At these first two pickings the sandy and sandy loam soils yielded higher percentages of their total cotton crop than the red clay soils, whether fertilized or unfertilized.

On sandy and sandy loam soils heavy and medium heavy phosphoric acid fertilization with normal amounts of other plant foods produced the largest percentages of the seed cotton open at the first picking. Normal fertilization yielded a larger percentage of the cotton open at the first picking than high nitrogen applications on sandy and red clay soils, while potash applications yielded still lower percentages of the total yield open at the first picking on all soils studied than did the high nitrogen applications. When used with commercial fertilizers air-slaked lime increased the tendency to cause early maturity, but when used alone the lime did not hasten maturity.

Cultivation of broach cotton in Dharwar, M. L. KULKARNI (*Dept. Agr. Bombay Bul. 33, 1909, pp. 8*).—In a comparative test Broach excelled Kumpta cotton by 100 pounds per acre in yield, and 8 per cent in lint percentage. Its cost of cultivation was nearly one and one-third times as great, but the value per acre of the yield was over one and one-third times as great.

Hindi cotton in Egypt, O. F. COOK (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 210, pp. 58, pls. 6*).—This paper presents observations on the results of the mixture of inferior Hindi cotton with Egyptian cotton, made during a visit to the cotton-growing districts of Egypt. It deals with the importance of uniformity in Egyptian cotton, the character of Hindi cotton plants and their lint and seed, and the characters of hybrids of Hindi and Egyptian cottons and their relationships.

The claim that Hindi cotton is all removed from the field at time of thinning was disproved by the fact that obvious hybrid forms and plants of the Hindi type remained in the fields, sometimes constituting more than 10 per cent of the total number of plants. Although the careful hand grading and sorting by cheap labor, which brings about uniformity in the Egyptian-grown cotton, is not possible in the United States, the author believes that with reasonable care in maintaining uniformity of type in the field it is not apparent "that the American-grown Egyptian cotton is likely to suffer any commercal disadvantage on the ground of lack of uniformity in comparison with the Egyptian crop."

Proceedings of the cotton-culture commission of the colonial agricultural committee (*Verhandl. Kolon. Wirtschaftl. Kom., 1910, No. 2, pp. 64, pl. 1*).—This report contains a collection of papers by different authors treating of the cotton-culture enterprises undertaken in German East Africa.

The possibilities of growing cotton in Togo, Uganda, and various sections in German East Africa are discussed, together with the advisability of establishing cotton gins and cottonseed-oil mills in certain localities. The possibilities of growing and exploiting *Eriodendron anfractuosum*, as well as species of Calotropis, plants from which fiber is obtained, are briefly noted.

Cotton growing in Ceylon (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 5 (1910), No. 14, pp. 181–200*).—This circular points out the prospects for the development of the cotton-growing industry under existing conditions in Ceylon, and the possible developments which might follow from either the introduction of foreign capital on a large scale or a vigorous attempt on the part of the Government to extend the industry. One of the principal hindrances to the investment of capital in this industry is the intermittent nature of the employment afforded for labor of cotton cultivation, but it is believed that the cultivation of cotton would be an industry well suited for the small native capitalists, who can not afford to wait long for a return.

Fibers used in textile and allied industries, C. A. MITCHELL and R. M. PRIDEAUX (*London, 1910, pp. XII+196+32, figs. 66*).—Microscopical descriptions and chemical tests are given, as well as general descriptive material regarding wool, silk, cotton, and other fibers in this handbook, which, as the authors state, deals with the principal fibers used in "what for want of a better term may be called the 'isolated' condition," that is, "fibers used in a more or less dissociated condition in spinning, weaving, cordage, brush making, and upholstery."

Studies on the microscopical examination of fibers, particularly linen and hemp, for technical purposes, R. Korn (*Jahresber. Ver. Angew. Bot., 7 (1909), pp. 189–234, pls. 2, figs. 12*).—Extended investigations are reported on the identification of fibers.

Report of field trials with varieties of oats, T. Milburn and A. W. Patten (*County Council Lancaster, Ed. Com., Agr. Dept., Farmers' Bul. 18, pp. 7*).—In a test of 6 oat varieties on each of 4 farms in 1909 Wide Awake and Banner produced the highest grain yields of 66 and 63¼ bushels per acre, respectively, while in 1910 the highest average yields on 3 farms were 54¾ and 53 bushels per acre, secured from Banner and Beseler Prolific, respectively. At 3 of the 4 centers in 1909 Irish seed gave higher grain yields than English seed, but the straw yields were approximately equal. In a milling test Banner gave 67.7 per cent of meal to grain and the Irish and English Waverly gave 63.3 and 58.8 per cent, respectively. Varieties of the grain producing type gave the higher yield percentages and the larger amounts of meal per acre.

Report on the experiments conducted by the German Potato-Culture Station in 1910, C. von Eckenbrecher (*Ztschr. Spiritusindus., 1911, Sup., pp. 3–60*).—The results of experiments with 140 varieties of potatoes are tabulated in detail and the performance record of each variety is described at length. These varieties were tested on experiment fields located in different sections of the country. Attention is given to yield of tubers, starch content, resistance to disease, and value for different purposes.

The highest yields of tubers were secured from the varieties Vater Rhein and Jubelkartoffel, and the highest yields of starch from Lucya and Vater Rhein. The varieties Schladen Ruhm and Agraria ranked highest in starch content.

Report on experiments with potatoes conducted in 1910 by F. Heine at Kloster Hadmersleben, W. Oetken (*Ztschr. Spiritusindus., 1911, Sup., pp. 65–75*).—The results for the year are reported upon at some length and the annual results secured since 1877 are summarized.

During this entire period an average yield of 24,206 kilograms per hectare of tubers, an average starch content of 18.41 per cent, and an average starch yield per hectare of 4,456 kilograms were secured. A total of 1,388 varieties was tested on 4,700 plats, exclusive of check plats. In the discussion of the different varieties special reference is made to yielding capacity, starch content, period of maturity, and the value for culinary, feeding, and industrial purposes.

Varieties of potatoes utilized for manufacturing starch, E. Parow (*Ztschr. Spiritusindus., 33 (1910), No. 37, p. 447; abs. in Chem. Ztg., 34 (1910), No. 133, Repert., p. 546*).—This article contains reports from 97 starch factories in regard to the comparative starch yields from various kinds of potatoes.

Analyses of potatoes grown in 1909 and 1910, J. F. Hoffmann (*Ztschr. Spiritusindus., 1911, Sup., pp. 61–64*).—The results of experiments covering two years, here reported in tabular form and discussed, point out that no one variety was markedly superior to any other grown in the test. The respiration experiments carried on in this connection showed that Up-to-date and Barbarossa were distinguished by good keeping quality.

Some potato fertilizer tests, F. H. Hall (*New York State Sta. Bul. 327, popular ed., pp. 4*).—A popular edition of Bulletin 327 (E. S. R., 24, p. 540).

Literature on the races of rice in India (*Agr. Ledger, 1910, No. 1 (Veg. Prod. Ser., No. 113), pp. 334*).—This is an index to the literature on the races of rice in India.

The chemical structure and its influence on the sugar content of Beta vulgaris, O. CLAASSEN (*Chem. Ztg., 34 (1910), No. 149, pp. 1329, 1330*).—A study was made of beets characterized by an exceptionally heavy root formation and of the appearance in the root of concentric, dark, or dark blue rings containing cell sap bitter to the taste. The roots of these beets were also malformed in other ways but mainly through many divisions.

The results of chemical analyses showed that the beets were exceptionally low in sugar and very high in nonsugars, but in moisture content there were no great differences as compared with normal beets. It was further found that as regards the mineral constituents the normal and the abnormal beets differed materially only in the content of potash, silicic acid, and chlorin. As it has been observed that when the calcium content is reduced the potash content is increased, the author believes that the high moisture requirements of the beet cause a heavy growth of secondary roots, and that with the water-soluble substances, which are the first to enter the beet, potash salts, and in part chlorids of potash, are taken up. As this increases the chlorin content the possibility for the lime to enter into combination in the beet is reduced. This explanation is given for the low sugar content of the abnormal beet which would result from the formation of calcium saccharids and saccharates, and from the particular form of the potash salts.

The influence of light on the composition of the sugar beet, F. STROHMER, H. BRIEM, and O. FALLADA (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 40 (1911), No. 1, pp. 11–28*).—The results are given of experiments with sugar beets in which the beets were so planted that part of them were shaded in the morning and part in the afternoon by trees.

It was found that the foliage growth of the shaded beets was greatly increased and at the expense of the root development. The shaded beets produced, in comparison with unshaded ones otherwise grown under like conditions, very small quantities of dry matter in the roots, and this loss of dry matter for the most part occurred in the sugar content, while on the other hand, the nitrogen content of the roots of the shaded beets was the higher. The leaves of the shaded beets contained appreciably larger quantities of oxalic acid than similar unshaded plants, and the ash content of both roots and leaves was increased by shading. Especially was the movement of the chlorids accelerated.

The authors, therefore, conclude that the shading of sugar beets is injurious to their development for sugar making, and that meteorological observations for the sugar-beet grower ought to include the measuring of the light intensity of the locality under consideration.

A bibliography is appended.

Report of an experiment on the manuring of swedes at several centers in the county, during 1907 and 1908, E. PORTER and R. C. GAUT (*County Council, Lancaster, Ed. Com., Agr. Dept., Farmers' Bul. 16, pp. 12*).—This bulletin reports the results of fertilizer tests of swedes at four centers in 1907 and at six in 1908. In each instance the plats were fertilized with 10 tons of farmyard manure per acre.

The average calculated profits at the ten centers indicate that the application of 10 tons more of manure resulted in a loss of 7 shillings 5 pence and that the highest gain after deducting the cost of the fertilizer followed an application of 1½ hundredweight of nitrate of soda. 4 hundredweight of superphosphate, complete fertilizers gave larger results than the incomplete mixtures.

Tobacco culture in Wisconsin, J. Johnson (*Wisconsin Sta. Bul. 206, pp. 3–30, figs. 6*).—This bulletin gives directions for tobacco production in Wiscon-and 3 hundredweight of kainit in adition to the 10 tons of manure. Three sin. The topics especially dealt with are the soil, fertilizer, and rotation requirements of tobacco, preparing the plant bed, growing and curing the crop, and the selection of varieties adapted to Wisconsin conditions.

Conference of wheat growers, with special reference to dry farming, J. Perry (*Dept. Agr. N. S. Wales, Farmers' Bul. 42, pp. 226, pl. 2, figs. 54*).—This presents a series of papers dealing with the growing and marketing of wheat, including a discussion of the special problems of growing the crop under dry-farming conditions.

The adulteration and misbranding of the seeds of alfalfa, red clover, Kentucky blue grass, orchard grass, and redtop, W. A. Taylor (*U. S. Dept. Agr., Office Sec. Circ. 35, pp. 6*).—This circular reports that of 1,214 samples of seed examined, 204 samples were found to be adulterated or misbranded, these being presented in tables, with the names and addresses of the dealers offering them for sale.

Of 317 samples obtained as orchard grass, 12 were adulterated with the seed of meadow fescue or rye grass. Of 371 samples obtained as Kentucky blue grass, 16 were wholly or in part Canada blue-grass seed. Of 526 samples offered as redtop without mention of timothy seed, 176 were found to contain timothy seed.

Orange hawkweed or paint brush, P. J. White (*New York Cornell Sta. Circ. 9, pp. 10–12, fig. 1*).—A discussion of the orange hawkweed or paint brush as a weed is followed by suggestions looking toward its control by salting, cultivation, or manuring.

HORTICULTURE.

Fertilizer experiments with small fruits, vegetables, and flowers, Heine (*Ber. K. Gärt. Lehranst. Dahlem, 1908–9, pp. 195–204, fig. 1*).—The results for 1908–9 are given of tests of various organic and inorganic fertilizers.

Pot culture experiments with a number of flowers indicate that lime nitrogen may be substituted for other nitrogenous fertilizers, provided it is mixed with the soil some two weeks before it is needed and provided basic slag is not used in conjunction with it. The author is of the opinion that the high lime content in the lime nitrogen may render the water-soluble phosphoric acid insoluble. Although lime nitrogen generally gave good results, it did not prove as lasting as ammonium sulphate when used with begonias and petunias.

[Report on fruits, vegetables, and ornamentals] (*Oreg. Agr. Col. Bul., 1. ser., 1911, No. 48, pp. 31–34, 36–38, 40–52, 58–68, pls. 13*).—Brief data and notes are given on the different varieties of vegetables, fruits, and ornamentals tested at the substation.

The iron-containing vegetables, Kochs (*Ber. K. Gärt. Lehranst. Dahlem, 1908–9, pp. 146–158, figs. 9*).—The results of experiments on the assimilation of various iron compounds by spinach, rampion, lettuce, sorrel, and beets are reported. The work thus far indicates that the iron content of these vegetables can be increased by fertilizing with various iron compounds. The practical value of these additions and methods of application are yet to be determined.

Cauliflower, F. F. Hasbrouck (*Pure Products, 7 (1911), No. 3, pp. 132, 133*).—This article deals with the selection of the seed, and the growing, storing, and pickling of cauliflower.

Fruit culture along the middle and lower course of the Volga, V. V. Pashkevich (*Ezheg. Dept. Zeml. [Russia], 30 (1909), pp. 400–425, pls. 14,* *fig. 1*).—The climatic conditions of the above region are described, together with the varieties of apples, cherries, and plums grown there and the local methods of culture.

Community fruit growing in Offenburg, Baden, R. FRITZSCHE (*Deut. Obstbau Ztg., 1910, No. 10, pp. 171–174*).—A descriptive account of community orcharding in Offenburg, including statistics of yields and revenues, is given.

[Resistance of peach buds and blossoms to frost], F. GARCIA (*New Mexico Sta. Rpt. 1910, pp. 17–18*).—The investigations reported indicate that peach buds and blossoms seem to stand a lower temperature in New Mexico than in many other parts of the United States. The greatest damage is done about the time the young peach sheds its calyx when the fruit is the size of a pea. The buds and blossoms withstood a temperature March 27 of 26° F. fairly well. A heavy frost on the morning of April 17, lasting for 2 hours and during which the temperature dropped to 24½°, resulted in serious injury to the crop.

The management of a bearing orchard, J. G. MOORE (*Wisconsin Sta. Bul. 207, pp. 3–34, figs. 14*).—This bulletin treats of those practices of orchard management which seem best suited to Wisconsin conditions. Consideration is given to the soil management of bearing orchards and young orchards, fertilization, pruning, and spraying.

An appendix contains general spraying directions.

A practical treatise on banana culture, J. GARCIA SALAS (*La Planta del Banano o Platano. Mexico: Govt., 1910, pp. 80, pls. 13*).—Directions are given for growing bananas, including suggestions for improving methods of culture commonly employed in banana-producing countries. The banana is discussed relative to its botany, uses, species, and varieties, climate, and soils, diseases, and other enemies, propagation, planting operations, cultivation, fertilizers, pruning, renewing, drainage, irrigation, harvesting, yields, regions of cultivation, import countries, and associated crops.

Lemon growing in Sicily, H. DE SOTO (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 118, pp. 794–795*).—The substance is here given of a report prepared by N. Marasa, an expert Italian pomologist, relative to the actual cost of growing lemons in Italy and the average cost of preparing and packing lemons for export to the United States. According to the statistics given the net profit from an acre of lemons in Sicily is about $48.50. The total cost of landing a box of lemons of first quality at New York City was determined as $2.05.

Conservation of fruits by cold, L. DE LOISY (*Rev. Soc. Sci. Hyg. Aliment., 6 (1908), No. 3, pp. 79, 80; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 3, p. 206*).—Refrigeration does not inhibit the ripening process going on in the interior of the fruit. Investigations by the author in regard to the most favorable time and temperature indicated these to be for peaches two months at 0° to 1.1° C., for oranges three months at 1.1°, for lemons four months at 3.3°, for grapes three months at —0.05° to +2.2°, and for ripe tomatoes from one to two months at 5.5°.

Shade trees in towns and cities, W. SOLOTAROFF (*New York and London, 1911, pp, XVIII+287, pls. 9, figs. 250*).—A treatise on shade trees dealing with their selection, planting, and care as applied to the art of street decoration; their diseases and remedies; and their municipal control and supervision.

The subject matter is the result of a study of shade trees in a great many towns and cities, together with experience gained in the administration of the work of the East Orange Shade Tree Commission.

Rock and alpine gardening, H. HEMSLEY (*London [1910], 2, ed., pp. 92, pl. 1, figs. 25*).—A treatise on the development of rock, alpine, and water gardens, including lists of suitable plants with hints on their cultivation,

The practical flower garden, HELENA R. ELY (*New York and London, 1911, pp. XIII+304, pls. 32, figs. 38*).—A popular work on floriculture, including a discussion of color arrangement of flowers, the raising of flowers and trees from seed, fertilizers and plant remedies, the treatment of terraces, and the wild garden.

FORESTRY.

Forest management, H. MARTIN (*Die Forsteinrichtung. Berlin, 1910, 3. ed., rev., pp. XV+281, pls. 11, figs. 4*).—A treatise on forest management intended for both instruction and practice. The work is divided into five parts treating in detail of the preliminary work for the laying out of working plans, the economic principles for the preparation of working plans, the laying out of working plans, their control and execution, and methods of forest management. In connection with the last-named subject consideration is given to the methods employed in different countries of Europe.

The extension of the regeneration area, L. A. HAUCH (*Centbl. Gesam. Forstw., 37 (1911), No. 4, pp. 147–161, figs. 3*).—An exposition on this subject, with particular reference to the proper maintenance and arrangement of older stands in the same forest area for the protection and best development of the regeneration tracts.

Investigations on the leafing-out and other behavior of shade- and light-grown beeches and some other hard woods, A. ENGLER (*Mitt. Schweiz. Centralanst. Forstl. Versuchsw., 10 (1911), No. 2, pp. 107–188, pls. 6*).—This comprises the results of observations and experiments covering a number of years relative to the influence of light and shade on the development of beech and other hard-wood trees

The subject matter is discussed under the following general headings: Observations on the leaf development in woods, the growth relations of beeches planted in light and in shade including experiments with forest trees and with cultivated seedlings, pot experiments with light and shade grown beeches, bud development in light and in shade, the influence of weather upon the leafing-out process, and a summary of the results and conclusions.

An appendix contains temperature, sun, and rainfall records for the months of April and May at the Adlisberg station for the period 1900 to 1910, during which the investigations were conducted.

Purple basket willow, C. D. MELL (*Amer. Forestry, 17 (1911), No. 5, pp. 280–287, pls. 2*).—This paper contains information relative to the commercial value and distinguishing characteristics of the purple willow (*Salix purpurea*) and its most important varieties and hybrids commonly planted for the production of rods used in making furniture and basket ware.

An artificial method of forcing basket willows (*Sci. Amer. Sup., 71 (1911), No. 1844, pp. 273, 274, figs. 5*).—The method herein described consists essentially in sprouting the willow rods in a forcing house so that the peeling can be done during the winter months when labor is cheap and plentiful. This method was successfully employed at Laurel, Md., during the past season.

Eucalypts in Florida, R. ZON and J. M. BRISCOE (*U. S. Dept. Agr., Forest Serv. Bul. 87, pp. 47, pls. 5, fig. 1*).—This bulletin embraces results of a preliminary study relative to the species of eucalypts best adapted for culture in Florida. The soil and climatic conditions of Florida are compared with those countries in which eucalypts grow successfully, reference is made to the early introduction of eucalypts into Florida, and data are given on the species now growing in the State, together with a list of species suitable for various sites, and suggestions relative to methods of planting most suited to Florida conditions. The bulletin concludes with a tabulated list of eucalypts suitable to

Florida, showing the quality of timber, growth, and uses under native conditions, and their possible range in Florida.

The authors point out that the feasibility of commercial planting in Florida is as yet undetermined.

Memorandum regarding leading eucalypts suitable for India, F. Booth-Tucker (*Agr. Research Inst. Pusa [India] Bul. 21, 1911, pp. 9*).—A list is given of some 34 eucalypts suitable for India, including explanatory notes relative to each, general notes relative to eucalypts, and notes on planting and felling.

Pinus insignis in South Australia: Its introduction and successful utilization, W. Gill (*Agr. Jour. Union So. Africa, 1 (1911), No. 2, pp. 164–168, pls. 4*).—A paper on this subject read at the Industrial Exhibition in Brussels, May, 1910.

Australian plants suitable for gardens, parks, timber reserves, etc., W. R. Guilfoyle (*Melbourne and London [1911], pp. 478, pls. 218*).—This work contains directions for sowing and raising Australian seeds; the treatment of Australian plants in gardens; an alphabetically arranged table for Australian plants, giving the botanical name, authority, common name, and a description; a list of eucalypts, showing the confusion of common names; and a list of the principal common names of Australian plants with their botanical names.

The effect of nitrate of soda upon the flow of Ceara latex, R. D. Anstead (*Planters' Chron., 6 (1911), No. 15, pp. 203–205*).—The author reports a preliminary experiment conducted by G. L. Newbery in Coorg in which the results obtained, although not conclusive, indicate that the flow of latex and yield of rubber is increased by the application of nitrate of soda, thus appearing to confirm the results reported by Wilcox (E. S. R., 22, p. 645).

Experiments are to be conducted on a larger scale.

Rubber-growing industry of the Philippine Islands.—Cost of production and profits, D. C. Worcester (*War Dept. [U. S.] Bur. Insular Aff. [Pamphlet], 1911, pp. 24, pls. 16*).—This consists of a compilation of information secured from different branches of the Philippine administration and from other sources relative to the present status of the rubber industry in the Philippine Islands. An estimate of the expenses and profits is given for a period of 11 years on a 1,000-acre plantation, the whole area to be planted by the end of the fourth year. Other information relative to the cost of land, clearing, planting operations, etc., is included.

Forest products of the United States, 1909 (*Bur. of the Census [U. S.], Forest Products 1909, pp. 178, dgms. 3*).—This consists of a statistical review compiled by the Bureau of the Census in cooperation with the Forest Service of this department relative to the production, consumption, imports, and exports of various forest products during 1909. The quantity and value of lumber, lath, and shingles is shown both by species and by States. The other products considered are crossties purchased, pulp-wood consumption, tanbark and tanning extract, slack cooperage stock, tight cooperage stock, veneers, poles, cross arms, brackets, insulator pins, and wood distillation. A short appendix is added relative to the production of naval stores.

The estimated total value at the point of manufacture of the domestic forest products in 1909 amounts to approximately $1,250,000,000, or an increase of 19 per cent over the 1908 estimate.

Austria-Hungary's timber trade and export, M. von Engel (*Osterreich-Angarns Hokhandel und Hokerport. Vienna, 1910, pp. 48, tables 2, dgms. 1*.—A commercial and trade review of the timber industry in Austria-Hungary, including statistics relative to the export of raw timber and various manufactured products to different countries.

Industrial materials: The woods, edited by P. KRAIS (*Gewerbliche Materialkunde: Die Hölzer. Stuttgart, 1910, vol. 1, pp. XVI+782, figs. 101*).—This is the first of a series of volumes to be issued on industrial materials.

The present volume is a handbook of information on wood as a material. The subject matter was prepared by 21 authors and deals with the various woods from the standpoints of forestry, botany, trade, commerce, statistics, freight, and shipping; wood testing; the detection and correction of diseases and defects; wood coloring, embellishing, preservation, and working; and the application of woods to various purposes.

Wood-pulp testing at the forestry court cellulose laboratory, United Provinces Exhibition, W. RAITT (*Indian Forester, 37 (1911), No. 1-2, pp. 30-34*).—Methods of determining the paper-making value of inferior woods of the United Provinces are described and a list is given of those woods which have yielded at least 40 per cent of bleachable pulp with a soda consumption of not more than 20 per cent.

Oxidizing enzyms and their relation to sap stain in lumber, I. W. BAILEY (*Bot. Gaz., 50 (1910) No. 2, pp. 142-147; abs. in Chem. Abs., 5 (1911), No. 5, p. 897*).—This work shows that sap stain in lumber is brought about by fungi and by chemical oxidation induced by the enzyms. It could be prevented in alder, birch, and cherry woods by treating the sapwood with boiling water.

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Timber estimating, A. F. HAWES (*Ann. Rpt. Comr. Agr. Vt., 2 (1910), pp. 191-204*).—Methods of estimating which can be applied by persons with little experience are described, volume tables for a number of important timber species in Vermont being appended.

The capital value of Würtemberg state forests, SCHICKHARDT (*Allg. Forst u. Jagd Ztg., 87 (1911), Apr., pp. 118-126*).—This is a discussion of methods for determining the capital value.

Contribution to the knowledge of the dynamic occurrences in the moving of timber on a timber slide, F. ANGERHOLZER VON ALMBURG (*Centbl. Gesam. Forstw., 37 (1911), No. 4, pp. 161-179, figs. 16*).—The author here elaborates a modification of the law of inclined planes with special application to the motion of timber in timber slides, including such phases as rate of fall, rapidity, friction, and curve radius.

Forest railways for the extraction of timber in Burma, F. A. LEETE (*Indian Forester, 37 (1911), No. 1-2, pp. 34-54, pls. 2*).—A self-balancing monorail system used in the transportation of logs is described.

Preliminary study of forest conditions in Tennessee, R. C. HALL (*Tenn. Geol. Survey Bul. 10, Extract A, 1910, pp. 56, pls. 13, maps 2*).—The results are given of a preliminary study conducted by the Forest Service of this Department in cooperation with the Tennessee State Geological Survey. The general condition of the forests, the various timber industries, and the forest regions are described, a number of special forest problems are discussed, and a forest policy for the State is recommended. A list of trees native to Tennessee, together with growth tables of white and chestnut oaks, is appended.

It is estimated that about 35 per cent of the total area of the State is in forests, and that a large part of this land is best suited for growing timber. The preservation of the forest, especially on steep slopes, the establishment of a fire protective system, the creation of state forests, and the employment of a state forester are recommended.

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Seventh annual report of the state forester of Massachusetts, F. W. RANE (*Ann. Rpt. State Forester Mass., 7 (1910), pp. 115, pls. 14, map 1*).—Introductory considerations deal with the organization and staff of the forestry department, recent protective legislation enacted, publications of the department, and other miscellaneous subjects. Part 1 reviews the general forestry operations of the department, including the examinations of woodlands and assistance rendered to owners, reforestation and forest nursery work, and forest fires for the year and protective measures used, and concludes with a statement of expenditures and receipts for the year ended November 30, 1910.

Part 2, giving the year's results in the suppression of the gipsy and browntail moths, is noted on page 257 of this issue.

Report of the superintendent of forestry, R. S. HOSMER (*[Bien.] Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 1909–10, pp. 17–55, pls. 8*).—This is a report for the biennial period ended December 31, 1910, relative to the management of Hawaiian forest reserves, forest extension, and miscellaneous forestry work. Reports of district foresters are appended, together with a summary of recommendations for the extension and improvement of forest operations.

According to the tabular data corrected to February 10, 1911, there are 23 forest reserves in Hawaii, comprising 575,154 acres, of which 386,547 acres are government land. A total of 597,381 trees was planted in 1909 and 725,022 trees in 1910, mainly by corporations. The experimental planting of Temperate Zone trees in higher altitudes by the Forest Service of this Department is being continued. During the last two years no serious forest fires have occurred.

Report of the forest nurseryman, D. HAUGHS (*[Bien.] Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 1909–10, pp. 56–66, pl. 1*).—This is a progress report on work done during the biennial period ended December 31, 1910, at the Government Nursery, Makiki Experiment Station, Tantalus Forest Station, and Nuuanu Station.

Report of the botanical assistant, J. F. ROCK (*[Bien.] Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 1909–10, pp. 67–88, pls. 12*).—This is a progress report on the botanical exploration of the Hawaiian Islands, including the work of establishing a herbarium of native trees, shrubs, and plants. Notes are given on the flora observed in different sections of the islands.

Progress report of forest administration in Coorg for 1909–10, C. McCARTHY (*Rpt. Forest Admin. Coorg, 1909–10, pp. 8+12*).—This is the usual annual report relative to the constitution, management, financial results, and administration of the state forests in Coorg. The more important data relative to alterations in areas, forest settlements, surveys, working plans, protection, grazing, and other phases, together with yields, returns, revenues, and expenditures are appended in tabular form.

Annual administration report of the forest department of the Madras Presidency for the twelve months ending June 30, 1910, A. W. LUSHINGTON, T. P. PEAKE, and F. A. LODGE (*Ann. Admin. Rpt. Forest Dept. Madras, 1910, pp. 65+CXLII+12*).—A report similar to the above relative to the administration of state forests in the Northern, Central, and Southern Circles of the Madras Presidency.

Forest administration in Würtemberg, F. GRANER (*Die Forstverwaltung Württembergs. Stuttgart, 1910, pp. 200*).—A detailed account is given of the administration of the forests in Würtemberg. The successive divisions of the text take up the forest growth and natural conditions of the country, forest districts and working regulations, forest and hunting legislation, the organization of the forest service, detailed management of the state forests, and forest statistics, including both state and corporation forests.

DISEASES OF PLANTS.

Crown gall of plants, its cause and remedy, E. F. SMITH, NELLIE A. BROWN, and C. O. TOWNSEND (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 213, pp. 215, pls. 36, figs. 3*).—This bulletin includes a brief history of investigations on the crown gall of plants in the United States and other countries, and detailed studies of the disease covering a period of six years.

The results are given of confirmatory inoculation and cross-inoculation experiments with the crown gall organism from the daisy (*Chrysanthemum frutescens*), arbutus, grape, alfalfa, peach, rose, quince, beet, hop, chestnut, poplar, and apple. The relationship of crown gall to hairy root is discussed, and experiments with the hairy root organism reported. The morphological and cultural characters of the causal organism as isolated from the crown gall of the daisy are described in full; the characters and observed differences in crown gall organisms from various sources are also noted. The authors discuss the question of species, varieties, and races of crown gall organisms, structure and growth of the tumors, chemical and physical changes produced in the gall and on adjacent but not directly involved tissue, physiological effects, losses due to the disease, and the best methods of dealing with it.

It is stated that crown gall is a disease common in nurseries on the roots and shoots of various plants and which may persist on the plants after their removal to orchards, vineyards, gardens, and hothouses; it also occurs on various field crops. The causative organism, at least that for the daisy galls, is a white schizomycete, *Bacterium tumefaciens* (E. S. R., 18, p. 950). This organism does not produce open cavities in the host, but seems to be present in small numbers in the living cells, causing a rapid proliferation, especially in soft and rapidly growing tissues. Cross inoculations with the daisy organism have produced tumors on many species in widely separate parts of the natural system (Compositæ to Salicaceæ). Schizomycetes grown from natural galls of the peach, apple, rose, quince, honeysuckle, arbutus, cotton, poplar, chestnut, alfalfa, grape, hop, beet, salsify, turnip, lettuce, and willow have been isolated, which closely resemble (as grown on agar) *B. tumefaciens* of the daisy, and some eight of which are able to produce tumors on the daisy and other plants, indicating that crown gall on all of these hosts is due to a polymorphic species, rather than to several distinct species.

Hard and soft galls and hairy root seem to be due to the same organism. It is claimed that crown gall is a disease which progresses slowly, stunting the plant at first, and finally destroying it unless removed by pruning or by the development of increased resistance of the host. Rigid state inspections and the rejection of diseased nursery stock are recommended.

These abnormal growths of plants designated as tumors or galls are believed by the senior author to be like malignant animal tumors in various particulars, such as permanent and very rapid new growth of affected tissues, enormous round-celled or spindle-celled hyperplasia, great reduction of the amount of conductive tissues, early necrosis with renewed growth at the margins, frequent recurrence after extirpation, extension of the disease to other parts by metastases, etc.

In the course of investigations on crown gall, a new disease of the sugar beet was discovered, due to a yellow schizomycete for which the name *Bacterium beticolum* n. sp. is proposed. The disease is called tuberculosis of the beet, and is characterized by overgrowths of a coarse nodular nature which soon disintegrate, leaving small cavities in the tissues.

Some troubles of New York plants, F. H. HALL (*New York State Sta. Bul. 328, popular ed., pp. 12, figs. 2*).—This is a popular edition of Bulletin 328

(E. S. R., 24, p. 549), in which apple troubles, beet leaf spot, cherry rot and mildew, hop mold (*Sphærotheca humuli*), frost injury to trees, pear troubles, Rhizoctonia on potatoes, and raspberry cane blight are especially discussed.

On the air infection of ergot and the dissemination of plant diseases by means of temperature currents, R. Falck (*Ztschr. Forst u. Jagdw., 43 (1911), No. 3, pp. 202–227, figs. 4*).—The author discusses the influence of air and temperature currents on the dissemination of fungus spores in general, and of Claviceps in particular, under 3 headings, viz (1) the spore discharge from the ascus, (2) the further distribution of the discharged spores by temperature currents, and (3) the infection of rye by wind-blown ascospores of *C. purpurea*.

On the mechanical measurement of the resistance of grains to disease, F. Straňák (*Deut. Landw. Presse, 38 (1911), No. 18, pp. 209, 210, fig. 1*).—The author figures and describes an instrument for determining the strength and hardness of the cuticle and outer layers of the stems of grains. By this method it is claimed that a fairly accurate estimate of the disease resistance of various species and varieties of grains can be obtained.

On the longevity of barley loose smut (Ustilago hordei) in infected seed, H. Zimmermann (*Ztschr. Pflanzenkrank., 21 (1911), No. 3, pp. 131–133*).—The results are given of planting 1, 2, and 3 year old barley seeds from plants which had been exposed to loose smut infection.

It was found that the seeds of susceptible varieties of barley which were smut infected when planted gave smutty ears, whether planted the first, second, or third year. It thereby showed that the smut mycelium in the barley grain can survive a three-year period of rest and, when subjected to the proper conditions for growth, may develop and produce smutty barley heads.

The influence of bunt on the shape of the wheat head, K. Miczyňski (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 3, pp. 232–234, fig. 1*).—Attention is called to the elongation of the heads of wheat attacked by stinking smut, in which the diseased heads are nearly twice the length of normal healthy ones.

Is Neocosmospora vasinfecta the perithecial stage of the Fusarium which causes cowpea wilt? B. B. Higgins (*North Carolina Sta. Rpt. 1909, pp. 100–116, figs. 16*).—The author gives the results of a series of cultures on various media of the cowpea wilt organism, *F. vasinfectum*, obtained from the interior of diseased cowpea vines, and of *N. vasinfecta* obtained from the exterior of cowpea stems which had been killed by the wilt.

The Neocosmospora cultures were made from perithecial material and were grown on several different culture media and for several generations, including pure mycelial, conidial, and ascosporic cultures all from one original perithecial culture.

The internal Fusarium cultures were obtained by aseptic transferrence of the mycelium from inside the stems to plates of cowpea-leaf agar. The ascigerous fungus (*N. vasinfecta*) showed the following characters: Perithecia always present; mycelial growth slow, never pure white, scanty, and usually strict; macroconidia and chlamydospores never present; bright colors (red, yellow, pink, or purple) not produced in any substratum; yellow spore clusters absent; and growth not occurring below the surface of the gelatin. On the other hand, the internal fungus (*F. vasinfectum*) showed perithecia never present; mycelial growth rapid and profuse on rich media, aerial, floccose, and on most media, pure white; chlamydospores present in all old cultures; bright colors produced on starchy foods; yellow spore clusters developed on agar, potato, and stems of cured cowpea hay; and growth produced below the surface of the gelatin.

In the light of the above facts the author concludes that for the present and until evidence is found to the contrary, Neocosmospora should be regarded as simply an accidental saprophyte, having no relation to the wilt of cowpeas or to the internal fungus (*F. vasinfectum*), which is probably the true cause of the wilt.

A new disease (Sclerotinia) of the mangold, E. S. Salmon (*Jour. Southeast. Agr. Col, Wye, 1909, No. 18, pp. 328–333, pls. 2*).—Attention is called to a storage rot of mangolds which in its earlier stages produces dark brown or blackish discolorations of portions of the interior of the root. Later, definite areas on the surface of the root soften, turn brown, and finally culminate in a rapid rot which destroys the entire root.

An examination of the discolored interior parts of the roots showed the presence of a fungus mycelium which penetrated the cells and occupied the intercellular spaces. These hyphæ secrete two ferments, one which softens and dissolves the cell walls, while the other attacks and kills the protoplasm of the cells, turning it a brown color. By means of cultures the fungus is demonstrated to be a parasite belonging to the Botrytis genus. The disease was produced on both swedes and mangolds by inoculation with Botrytis conidia obtained from attacked mangolds.

As a remedy for this rot the author advises good ventilation and drainage of the storage pit, the rejection of all cut and bruised roots, and the avoidance of turnip, swede, mangold, or potato tops as a covering for the pit.

Field experiments on the control of the potato scab, A. Bernhard (*Deut. Landw. Presse, 38 (1911), Nos. 15, pp. 168, 169, figs. 3; 16, pp. 179, 180, fig. 1*).—The author reports the results of further experiments (E. S. R., 23, p. 744) with sulphur in combating the potato scab. Marked beneficial results were obtained by using the sulphur in controlling the scab, in greater resistance to leaf-roll disease, and in obtaining yields of potatoes less subject to rot.

Wart disease or black scab of potatoes, E. S. Salmon (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 294–318, pls. 5*).—The author discusses the life history of the organism, characters of the disease, its continued dissemination, present distribution in England, Wales, Scotland, and Ireland, and the prohibition of exportation of potatoes on account of the prevalence of wart disease in Great Britain. It is claimed that under the existing laws and conditions farm lands generally are in great danger of becoming infected, that land once infected remains so for eight years, and that the use of sulphur, lime, and soot have proved absolutely valueless in combating the disease.

Wart disease of potatoes, and horse-radish disease in Cheshire, T. H. Middleton (*Bd. Agr. and Fisheries [London], Intel. Div., Ann. Rpt. Proc. 1909–10, pp. 36–61, 66, 67*).—In a report on the Destructive Insects and Pests Order of 1910 the status of these diseases in England is given, including the present distribution of the wart disease of the potato, susceptible and resistant varieties, the results of experiments in soil disinfection with sulphur, lime, lime and sulphur, soot, and soot and sulphur, the results of variety tests at many centers of the disease as to the immunity or susceptibility of some 18 varieties of potatoes, and a brief note on the horse-radish disease in Cheshire.

In soil disinfection for controlling the wart disease of the potato, the treatment in every case was a complete failure. In the variety test the Langworthy type was found to be immune to the disease, while many other varieties under the same conditions of soil infection were badly diseased. It is stated that the disease is dangerous and very difficult to eradicate, and that cleanliness and the destruction of infected tubers, stems, and all other potato débris is a most important factor in combating the disease.

In discussing the horse-radish disease (*Pseudomonas campestris*), attention is called to the fact that only about one-fourth of the area formerly devoted to this vegetable is now planted. This reduction is due, it is claimed, to the ravages of this disease. Although it is usually supposed that *P. campestris* attacks all cruciferous crops, yet growers were unanimous in their opinion that any other crop, such as cabbages, Brussels sprouts, etc., could be successfully grown on badly diseased land and invariably produce clean, healthy plants. Two forms of the disease are common, one in which the interior of the horse-radish rots throughout its whole length and the roots quickly become hollow, and the other in which the interior remains sound but the outer portions rot.

On diseases of sugar beets in 1910, O. FALLADA (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 40 (1911), No. 1, pp. 34–40, figs. 4*).—The author gives the distribution and relative intensity of the following diseases of sugar beets in Austria-Hungary: Damping off, heart or dry rot, root rot (*Rhizoctonia violacea*), crown gall, downy mildew, and leaf spot.

In discussing the crown gall of the sugar beet the theories of several investigators as to the cause of the disease are given, together with a description of the structure of the tumor.

Seed beds of sand as a means of combating the root rot (Thielavia basicola), M. BENINCASA (*Bol. Tec. Coltiv. Tabacchi [Scafati], 10 (1911), No. 1, pp. 3–22, figs. 7*).—The author compares the results of experiments on using ordinary garden loam, pure sand, and a volcanic cement pumice (pozzolana grigia di Tivoli) as materials for seed beds for tobacco in regions affected with the root rot organism (*T. basicola*). Artificial fertilizers were used on both the volcanic and sandy soil beds.

The conclusion is drawn from these experiments that the usual vehicle of infection is the soil commonly used in making the seed beds, and that heating this soil to a temperature of 90° C. is not sufficient to entirely prevent the rot in the seed beds. The seed beds of sand proved very efficient in controlling the rot, while the volcanic soil gave the best results of all, both as to vigor and growth of seedlings and in checking the rot. This was due apparently to the physical condition of the soil, which permitted a robust development of both the tops and roots of the tobacco plants by furnishing a warm and well aerated seed bed.

It is suggested that other similar substances, such as coal ashes, volcanic scoria, and other volcanic rocks, naturally or artificially pulverized, should act in the same manner as the volcanic material. As a means of controlling the disease in the field the author advises the use of resistant plants like those grown in the volcanic seed beds or in sand, and crop rotation, preferably with grain.

[Fruit diseases] *Oreg. Agr. Col. Bul., 1. ser., 1911, No. 48, pp. 52, 54, pls. 2*).—Attention is called to the prevalence of pear blight on both apples and pears, and a warning is given that if not better controlled a serious epidemic may occur. Apple scab is also reported as becoming troublesome in La Grande and Cove districts, while considerable so-called winter injury was found in the spring of 1910 in the vicinity of La Grande and Union.

Hypochnose of pomaceous fruits, F. L. STEVENS and J. G. HALL (*North Carolina Sta. Rpt. 1909, pp. 76–85, figs. 8*).—Previously noted from another source (E. S. R., 21, p. 244).

Scab, Monilia, and white leaf spot on different fruit trees, G. KÖCK (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 3, pp. 209–213*).—On account of the abnormal weather conditions during 1910 these diseases were very prevalent on different kinds of orchard trees, and an opportunity was thereby afforded of observing the susceptibility or resistance of many varieties.

The author gives a list of the varieties of apples and pears that were observed to be susceptible or resistant to each of these fungi.

The red color of the fruit, and the scab of apples and pears, J. ERIKSSON (*Ztschr. Pflanzenkrank., 21 (1911), No. 3, pp. 129–131, figs. 2*).—The author takes issue with E. Voges, who in a recent article (E. S. R., 24, p. 450) claimed that red-skinned apples are more resistant to scab than other kinds. He cites examples of red and yellow skinned varieties of both apples and pears which were badly attacked by this disease, not only the fruit but even the leaves being badly injured in some instances.

Black spot or apple scab, E. S. SALMON (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 267–270, pls. 3*).—The author gives the history of an attack by apple scab in an orchard where for several years the disease was neglected until all the fruit of certain susceptible varieties was ruined, yet which was practically controlled by judicious spraying with a 4 : 100 mixture of copper sulphate in February, followed by two or three sprayings with Bordeaux mixture.

Cooperative spraying at the Cove for apple scab (*Oreg. Agr. Col. Bul., 1. ser., 1911, No. 48, p. 29*).—The results are reported of experiments undertaken to determine the most effective time to spray with lime-sulphur mixtures for apple scab under the local climatic conditions. Fourteen-year-old trees of the Mammoth Black Twig, which is a very susceptible variety, a 1 : 15 solution of lime-sulphur mixture, and a hand pump with a pressure ranging from 100 to 125 pounds were used in these tests.

The results indicate that the proper time to spray under the local conditions is when the blossoms are showing pink, which occurs about the 1st of May, and that only the one application is necessary, as later sprayings showed no evident advantage over the first in controlling the scab.

Tumors on apple trees, P. SORAUER (*Ztschr. Pflanzenkrank., 21 (1911), No. 1–2, pp. 27–36, pls. 2*).—The author claims that the twig swellings or tumors often seen at the base of the side twigs on apple and pear trees are not due primarily to capsids (*Orthotylus nassatus*), as is usually supposed, but are initiated by frost injuries to the inner cells of the shoot, which later are attacked by the capsids.

New fig anthracnose (colletotrichose), F. L. STEVENS and J. G. HALL (*North Carolina Sta. Rpt. 1909, pp. 86–89, figs. 3*).—Previously noted in part from another source (E. S. R., 21, p. 447).

Pruning and the inoculation of the olive knot bacteria, L. SAVASTANO (*Bol. Arbor. Ital., 6 (1910), No. 1, pp. 30–33*).—From observations and experiments the author concludes that the infection of healthy olive trees with the olive knot organism by means of pruning tools rarely occurs. Nevertheless, it is suggested that the tools while being used should be sterilized.

American gooseberry mildew, T. H. MIDDLETON (*Bd. Agr. and Fisheries [London], Intel. Div., Ann. Rpt. Proc. 1909–10, pp. 5–25*).—In a report to the secretary of the Board of Agriculture and Fisheries on the Destructive Insects and Pest Acts of 1877 and 1907 the present status of the American gooseberry mildew in England is discussed, including regions infected, severity of infestation, susceptibility of different varietes of gooseberres, sources of infection, and remedies.

Nine districts are named where the disease is thoroughly established or is known to exist. Instances are recorded of infection from returned empty baskets which had contained diseased fruit, from infected clothes and boots of workmen, from wind-carried spores, from the introduction of diseased plants, and from reinfection from winter spores dropping on the soil.

The best remedy found for controlling the disease was late fall or early winter pruning, in which all old wood, unnecessary branches, suckers, and the tips of shoots the ends of which were covered with mildew, were removed and burned. Winter spraying with Bordeaux mixture and with "sour" Bordeaux mixture (from 4 to 5 per cent solution) did not prevent fruit infection by the mildew.

The American gooseberry mildew, E. S. SALMON (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 271–293, pls. 4*).—A history is given of the spread of this disease in Kent, England, the damage done by it, the extent of the infected area and remedies used for its control and the success obtained by their use.

It is claimed that the disease obtained a foothold through several growers of gooseberries concealing its presence on their plantations until the disease became very serious and widely disseminated. It is stated that no success can be obtained in eradicating it unless the winter pruning of infected shoots is done quite early and very thoroughly. For summer control to prevent further infection by conidia, the use of freshly mixed potassium sulphid is claimed to be the only sure remedy.

The Sclerotinia (Botrytis) disease of the gooseberry, or die back, E. S. SALMON (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 319–327, pls. 5, fig. 1*).—A description of and remedies for this disease are given.

The author claims that the sclerotia formed by this fungus produce both conidia and ascospores. The prompt removal and destruction of all dead and dying bushes carried out for a few seasons is claimed to be more efficacious in stamping out this disease than spraying.

Teratological forms of Oxycoccus macrocarpus, C. L. SHEAR (*Science, n. ser., 33 (1911), No. 840, p. 194*).—The author reports a malformation of the cranberry plant of both economic and scientific interest, occurring at Grand Rapids, Wis. The flowers become erect instead of drooping, and the calyx and corolla, and frequently the stamens and pistil, are changed into leaflike structures.

No insects or fungi have been found to bear a causal relation to the malformation, and the trouble is supposed to be caused by a prolonged and excessive stimulation of vegetative growth.

On the abnormal branching of Asparagus sprengeri, A. Y. GREVILLIUS (*Ztschr. Pflanzenkrank., 21 (1911), No. 1–2, pp. 17–27, figs. 7*).—Attention is called to an abnormal branching of this ornamental plant, in which at the base of many of the main branches one or more knotlike processes up to 2½ centimeters in diameter developed. These deformities were usually found to occur on plants growing in an atmosphere saturated with moisture, in a soil thoroughly watered, and in poorly ventilated places (greenhouses). The malformation occurs in both rich soil and poor soil, while instances have also been noted of its occurrence on plants growing in the open.

Carnation alternariose, F. L. STEVENS and J. G. HALL (*North Carolina Sta. Rpt. 1909, pp. 72–75, figs. 2*).—Previously noted from another source (E. S. R., 21, p. 449).

The mildew of the oak, M. MANGIN (*Rev. Eaux et Forêts, 50 (1911), No. 8, pp. 225–239*).—After giving the opinions of various investigators as to the taxonomic position of this serious European oak mildew, the author discusses its characters and development, the species of oak attacked, the methods of propagation, the damage done by it, and possible remedies.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

A systematic synopsis of the muskrats, N. HOLLISTER (*U. S. Dept. Agr., Bur. Biol. Survey, North American Fauna No. 32, pp. 38, pls. 6*).—The author recognizes three existing species, *Fiber obscurus*, *F. rivalicius*, and *F. zibethicus*, and 11 varieties of the last-named species. Three fossil species are recognized, of which two are described as new to science. A brief account is given of the distribution, habits, and economic relations of muskrats, a more extended account of which, by D. E. Lantz, has been previously noted (E. S. R., 23, p. 356).

A key to adult muskrats in fresh pelage, a bibliography of 55 titles, and a colored map showing the distribution of muskrats as known at present are included.

A study of the food of moles in Illinois, J. A. WEST (*Bul. Ill. State Lab. Nat. Hist., 9 (1910), Art. 2, pp. 14–22*).—"The contents of the stomachs here reported have shown perhaps a greater amount of insect food and somewhat smaller ratios of earthworms than those examined by other writers, but there is a substantial agreement to the effect that half or more of the food of the mole consists of insects and their larvæ, most of them noxious. So far as its food is concerned, the mole is thus beneficial, on the whole. There is no direct evidence that it will eat potatoes or other tubers, but circumstantial evidence on this point is so strong that the mole must remain under suspicion, even admitting that mice of herbivorous habit may occupy mole runs in fall. In this paper it is shown, for the first time, that corn may form an important item of the food of moles; that recently planted corn is sometimes destroyed by them; and that if numerous in corn fields in spring, they are capable of doing considerable damage there."

A plague-like disease of rodents, G. W. MCCOY (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Bul. 43, 1911, pp. 53–71*).—"A disease which presents lesions very similar to those of plague has been found among ground squirrels. The disease is readily transmitted to guinea pigs, mice, rabbits, monkeys, and gophers, and plague-like lesions are produced in at least some of these animals. Rats are but moderately susceptible to the infection. Cats, dogs, and pigeons appear to be immune.

"The disease may be transmitted artificially by subcutaneous, cutaneous (vaccination), nasal, and intraperitoneal inoculation. The mode of transmission in nature is unknown, but there is some experimental evidence that suggests that fleas may serve as carriers. The disease probably is not spread by mere contact of healthy with infected animals. The infectious agent has not been isolated. On account of the number of species susceptible, it seems likely that it is bacterial, not protozoan. The causative agent is present in the circulating blood, as well as in the various tissues where it causes focal lesions. The thermal death point of the organism as it is found in the animal's body is between 55° and 60° C. Several observations appear to indicate that the disease is a febrile one."

A contribution to the study of rat leprosy, D. H. CURRIE and H. T. HOLLMANN (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Bul. 41, 1911, pp. 13–32*).—Following a review of the literature relating to the subject notes by the authors on 12 cases of rat leprosy are recorded. The conclusions drawn are as follows:

"In some cases of artificially acquired rat leprosy the onset is with bronchopneumonia, accompanied by a septicemia and without other demonstrable lesions. In other cases of this disease pneumonia is a very early lesion, but we can not positively state that it is always the first lesion. The animal may die in the pneumonic stage before other lesions present themselves or it may develop pneumonic symptoms and recover from the same only to develop later the well-known lesions of chronic rat leprosy; or, again, the pneumonia may persist until after the development of the lesions of the skin and abdominal viscera. During the stage of the disease in which the animal is very ill certain mites (*Lælaps echidninus*) were found to be very numerous on the animals' bodies. During the stage of the disease in which septicemia is marked these mites' digestive tracts contain the bacilli of rat leprosy in considerable numbers, and therefore these parasites may be one means of transmitting the disease. This latter probability, however, is, of course, not proven."

A bibliography of 17 titles relating to the subject is appended.

Report of the state entomologist, T. B. Symons (*Rpt. Md. Hort. Soc., 12 (1909), pp. 158–184, pls. 2*).—It is stated that 289,652 of 1,197,096 orchard trees inspected during the year were found infested with San José scale. Nursery inspection and public spraying work is reported on and a brief account is given of the occurrence of a few of the more important insect pests, and of dipping and spraying experiments, etc.

The insects of New Jersey, J. B. Smith (*Ann. Rpt. N. J. State Mus., 1909, [pub. 1910], pp. 15–880, pls. 10, figs. 322*).—This is a revised edition of the author's catalogue of the insects occurring in New Jersey (E. S. R., 12, p. 367).

Report of entomologist, R. I. Smith (*North Carolina Sta. Rpt. 1909, pp. 32, 33*).—Experiments conducted with the common red house ant, *Monomorium pharaonis*, which in August became abundant in the agricultural building, demonstrated that they may be kept off laboratory tables, desks, shelves, etc., by the use of a saturated solution of bichlorid of mercury, one application being effective for several weeks, except for an occasional stray individual. Brief statements are given of work with corn weevils and San José scale.

Insect pests [in the West Indies, 1909–10], H. A. Ballou (*West Indian Bul., 11 (1911), No. 2, pp. 85–94*).—The author reports upon the more important insect pests of the year that attacked sugar cane, cotton, cacao, citrus, rubber trees, sweet potato, green manure crops, ground nuts, and onions.

Report of economic zoology for the year ending April 1, 1909, F. V. Theobald (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 87–196, pls. 3½, figs. 2*).—In this report the author considers the insects and other enemies which during the year were injurious to domesticated animals, fruit trees and bushes, corn, grass lands, root crops, pulse, hops, vegetables, flowers, forest trees, and stored goods, or caused annoyance to man. A list and synoptic table of, and notes on, the British Culicidæ are included. It is said that by far the worst attacks during the year were those of the eelworm and frit fly in corn.

Brief mention is made of a plague of noctuid caterpillars (*Laphygma exempta*) that visited the town of Bulawayo, Rhodesia, in December, 1907.

Destructive Insects and Pests Order, 1910 (*Bd. Agr. and Fisheries [London], Intel. Div., Ann. Rpt. Proc. 1909–10, pp. 25–69, pls. 2*).—The pests scheduled under the Destructive Insects and Pests Order of 1910 are discussed, namely, the grape phylloxera, San José scale, Mediterranean fruit fly (*Ceratitis capitata*), Colorado potato beetle, large larch saw fly (*Nematus erichsonii*), potato moth (*Lita solanella*), gypsy and brown-tail moths, nun moth (*Liparis monacha*), cherry fruit fly (*Rhagoletis cerasi*), narcissus fly (*Merodon equestris*), black knot, wart disease of potatoes (*Synchytrium endobioticum*), tomato leaf spot (*Septoria lycopersici*), and melon or cucumber canker (*Mycosphærella citrullina*).

The unscheduled pests noted (pp. 62–69) are the felted beech coccus (*Cryptococcus fagi*), beetles on osier beds (*Galerucella lineola, Phyllodecta vitellinæ*, etc.), horse-radish disease in Cheshire due to *Pseudomonas campestris*, "leather-jacket" or crane fly larvæ which caused injury to oats in Lancashire, frit fly inquiry, and bee disease in the Isle of Wight.

The principal insects injurious to horticulture during 1908–9, M. H. Swenk (*Ann. Rpt. Nebr. Hort. Soc., 40 (1909), pp. 75–128, pls. 16*).—In this report the author deals with insect pests of fruits, shade trees, and ornamentals that came to his attention during the two years prior to April 1, 1910.

The mulberry borer (*Dorchaschema alternatum*) is stated to have been a serious pest on the mulberry tree in the vicinity of Lincoln during the spring of 1908. Fifty per cent of the larvæ working in the stems were found to be parasitized by a braconid. In investigations made in the forest reserve near Halsey July 10, it was found that about 35 per cent of the new tips of the young jack pine (*Pinus divaricata*) and Scotch pine (*P. sylvestris*) were affected by the pine-tip moth (*Evetria frustana*), and practically all of them were dead. A brief report of the results of studies of the parasitism of the white-marked tussock moth in 1908, prepared by C. H. Gable is presented. The occurrence of and injury caused by numerous other species is briefly considered.

Report of the government entomologist for the year 1909–10, C. C. Gowdey (*Rpt. Govt. Ent. Uganda, 1909–10, pp. 24*).—The author here reports upon the insects that were injurious during the year to various crops in Uganda, as follows: The Mediterranean fruit fly (*Ceratitis capitata*), coffee beetle (*Stephanoderes coffeæ*), *Ceroplastes ceriferus*, and *Ceroplastes* n. sp., which were the source of injury to coffee; the cacao fruit fly (*Ceratitis punctata*), *Stictococcus dimorphus*, cacao beetle (*Adoretus hirtellus*), and *Gryllotalpa africana*, which injured cacao; the citrus psylla (*Trioza* sp.) the orange butterfly (*Papilio demodocus*), scale insects (*Mytilaspis gloveri* and *M. citricola*), and plant lice (*Aphis citri*). attacking citrus; cutworms injurious to garden crops; the cotton stainer (*Oxycarenus hyalipennis*) and the cotton bollworm (*Earias insulana*), which attacked cotton; the castilloa borer (*Inesida leprosa*). *Termes bellicosus*, and *Pulvinaria psidii*, which were injurious to rubber; the sweet potato caterpillar (*Acræa terpsichore*), the sweet potato weevil (*Cylas formicarius*), and *Conchyloctenia punctata parummaculata*, which injured sweet potatoes; the palm weevil (*Rhyncophorus phœnicis*) and *Aspidiotus cydoniæ*, which injured palms; and the Congo floor maggot (*Auchmeromyia luteola*).

Report of the entomologist [of Ceylon], E. E. Green (*Admin. Rpts. Roy. Bot. Gard. Ceylon, 1909, Ed., Sci., and Art, pt. 4, pp. 4–6*).—In this report brief accounts are given of the occurrence and injury caused by some of the more important insects, particularly the shot-hole borer (*Xyleborus fornicatus*). A new rubber pest that caused considerable damage to young rubber plants on one estate was found to be the slug, *Mariaella dussumieri*.

Some insect pests of the sugar cane, J. J. Quelch (*Timehri, Brit. Guiana, n. ser., 1 (1911), No. 1, pp. 9–14*).—Mention is made of 10 insect enemies of the sugar cane in British Guiana and of 12 birds that assist in combating them.

Insects injurious to the peach trees in New Jersey, J. B. Smith (*New Jersey Stas. Bul. 235, pp. 3–43, pls. 4, figs. 14*).—Nine insects that are the source of injury to peach trees in New Jersey and require treatment in the orchard are here considered, namely, the peach borer, plum curculio, San José scale, terrapin scale, black peach aphis, green peach aphis, shot-hole borer, peach twig moth, and rose chafer, brief accounts being given of the life history, injury, and remedial measures for each.

The peach borer, which occurs throughout the State, is much more injurious in the lighter soils of the southern section of New Jersey than in the more stony, hilly North. A report of studies of the life history and remedial measures for this borer, conducted by the author, has been previoulsy noted (E. S. R., 10, p. 656).

Observations made during the seasons of 1909 and 1910 indicate that the appearance of adults prior to July 1 is exceptional. It is estimated that not 10 per cent of the eggs actually laid ever produce larvæ that secure entrance to feeding quarters in the tree. From collections made during the season of 1910, it appears that there are five stages between the eggs and full grown larva. "Even the most-advanced caterpillars do not mature until well along in June, while some of those that hatched very late do not complete their growth in time to transform the first season, but lie over a second winter, practically full grown, and do some little feeding at the beginning of the next summer. . . . No cocoons at all were found, in 1910, on June 24; July 8 they were to be found in some numbers, and on July 13 moths had begun to emerge, making an extreme of 19 days, of which perhaps 15 may be credited to the actual pupal stage."

Every tree set out should be closely examined for signs of the borers or borer work and every tree that may have a borer in it discarded. "An existing or already infested orchard should be carefully examined at least twice in each year; as late as convenient in fall, and again in the following end of May or early June. In the fall examination the earth should be removed from around the base of the trees to a depth of at least 6 and preferably 8 inches and every sign of a wound or place from which gum exudes should be investigated." Examinations should again be made between the end of May and the middle of June, by which "time the borers that wintered in the second or third stage will have reached the fourth stage at least and will show signs of their presence even if pretty well down. Their feeding will not have been sufficient to have caused serious harm, and careful work at this time should result in the elimination of at least 95 per cent of all the borers present in the orchard. Leave the base of the tree exposed for a few days now, to toughen the outer bark, and then, before again drawing up the soil, spray very thoroughly with a lime-sulphur, arsenate of lead mixture, to which an excess of lime has been added. Use 1 pound paste arsenate of lead to every 5 gallons of lime-sulphur, or 1 pound of dry arsenate to every 10 gallons of lime-sulphur, and apply with all the force possible to the exposed crown and for a distance of 18 to 24 inches above the surface. Then cover and hill up at least 6 inches around the trunk after the application is thoroughly dry. The strength of the lime-sulphur wash may be that of the ordinary winter spray with double the required amount of lime. . . . The lime and sulphur will weather above ground and may carry with it the arsenate of lead; therefore, it seems desirable to make at least two additional applications to the trunk above ground, say one about July 10 and the other about August 1. Below ground the soil and moisture will maintain the poisonous coating for the entire season."

As a result of observations and experiments made during the seasons 1909 and 1910 and after going over records of previous experiments, the author concludes that mechanical coverings of paper and other materials are not of sufficient value to be further recommended. It is pointed out that a protective covering must be in place not later than July 1, and must be maintained intact until September 1 at least, if all borers are to be excluded. The various combinations of clay, lime, cowdung, soap, and other messes are all good if they can be applied well enough and cheaply enough to afford complete protection.

Egg-laying by the plum curculio begins in south Jersey by May 10. The eggs hatch in about a week, and the larval galleries and young larvæ may be found in dropped fruit any time from May 20 to early July. The heavy part of the brood matures in mid-July as larvæ and during early August as adults.

The terrapin scale is confined to Cumberland County, where it is more injurious than the San José scale and has led to the abandonment of orchards in some instances. The black peach aphis occurs throughout the State, but does injury only in warm light soils and mainly during the early life of the tree. The green aphis, which is always present to some extent everywhere in the State, only becomes seasonally and locally troublesome on younger trees. The peach twig borer has been found by the author throughout the State, and in some seasons and localities it does noticeable injury and may stunt young trees to some extent.

Insects injurious to citrus fruits and methods for combating them, W. V. Tower (*Porto Rico Sta. Bul. 10, pp. 7–35, pls. 5*).—In this bulletin the author deals with 12 of the more important insect enemies of citrus fruits in Porto Rico, and their natural enemies, including methods of propagation and insecticides, with directions for their preparation and application.

The orange leaf weevil (*Diaprepes spengleri*) appears during May, June, and July, and again in November, there being two broods annually. The larvæ feeds on the roots of the orange, in a few cases having been found damaging the trees to such an extent that the leaves turn yellow and drop off. The guava, avocado, mango, and rose are also food plants of the adult. "When this insect appears spraying should be resorted to with arsenate of lead, 4 pounds to 50 gallons of water. If there is a great deal of scab in the groves it is recommended that a fungicide be applied with the insecticide."

The small orange leaf weevil, a ravenous feeder on orange leaves, especially the new growth, is a pest that was first noticed in January and February, 1908, in the San Juan district and near Arecibo in groves planted in sandy soils. In 1908 all the beetles disappeared by March 1, but reappeared again in June and during the blossoming period were seen scarring the fruit. The eggs, which vary in number from 6 to 24, are deposited in clusters between the leaves. On hatching the larvæ soon fall to the ground and feed on the roots of the orange trees. The treatment is the same as for the orange leaf weevil.

The May beetle (*Lachnosterna* sp.) is the source of injury more particularly noticeable in young groves, especially where the ground has been broken for the first time. It generally appears during April, May, and June and is a voracious leaf feeder. The caculo, the common name by which the larva of this beetle is known in Porto Rico, feeds on the roots of orange, sugar cane, and a number of common grasses, causing considerable destruction, often as many as 50 having been taken from about the base of a single young orange tree.

The orange dog, a papilionid caterpillar which has been found at the station during July and October, feeds on the leaves of the orange and when present in large numbers causes considerable damage as it is a ravenous feeder. Satisfactory results have been obtained in combating this pest by spraying with arsenate of lead, 3 pounds to 50 gallons of water.

The brown ant (*Solenopsis geminata*), which attends the white fly and the Lecanium scale, attacks the young, tender shoots and leaves of the orange when its natural food supply is cut off. The ants carry sand up about the base of the trees and when the food supply is scant they gnaw the bark where it is covered by their sand houses. Often when pineapples have been removed from between rows of orange trees the ants attack the latter in great numbers, scarring the trees, eating young, tender shoots, and cutting holes in the fruit. Carbolic acid emulsion is said to be the simplest and most inexpensive spray to be recommended in combating them.

The woolly white fly (*Aleyrodes howardi*) feeds upon the guava and orange and is attended by ants. A red spider feeds upon the essential oils of the orange, preferably on the under or shady side of the fruit or leaf, causing them to become rusty in appearance. The adult is readily held in check by sulphur sprays or by soap or kerosene emulsion. A rust mite closely resembling the Florida species and probably identical with it was first discovered on orange, grapefruit, and lemon in Porto Rico during the spring of 1909.

A preliminary account of the four species of scale described as the source of injury to citrus on the island has been previously noted (E. S. R., 22, p. 252). The purple scale which is present in all cultivated and wild groves on the island is the most serious orange pest. Oviposition continues over a period of from 8 to 11 days, from 40 to 80 eggs being deposited. The incubation period is shorter than the period of oviposition, the first egg hatching before the last is laid. Incubation has been found at times, however, to require as many as 18 days. The adult males appeared in 5 weeks, while 7 weeks are required for the development of the females. The life cycle of the female is said to require from 8 to 9 and in some cases 10 weeks.

Infestation by the white scale (*Chionaspis citri*), which is generally found on the trunks and branches of old trees, usually starts at the base and gradually works up among the branches and often into the young twigs. The black fungus that parasitizes this scale is said to be rather slow in spreading in cultivated groves. Life-history studies at the station show that this scale requires the same length of time to develop as does the purple scale. "The most effective emulsions are kerosene with carbolic acid, 1 part of the mixture to 5 of water, and crude oil with carbolic acid, 1 part of the mixture to 15 or 18 of water."

The Florida red scale (*Chrysomphalus aonidum*), which is quite prevalent in citrus groves, is generally found on the leaves and fruit of the orange and lemon. It does not spread as rapidly as the purple and white scales but when found on the fruit is very difficult to remove. About 8 or 9 weeks are required for its development. The red-headed fungus (*Sphærostilbe coccophila*) has been found preying upon it. The treatment is said to be the same as for the purple scale.

The hemispherical scale, generally found on the small branches and leaves and occasionally on the fruit, attacks many ornamental plants but is not considered a serious pest as it is readily held in check by one or two sprayings of kerosene emulsion. It is attended by ants which distribute the young from place to place. It is preyed upon during the rainy season by a white fungus (*Sporotrichum* sp.).

Brief notes are presented upon beneficial fungi and methods of their introduction in combating scales. The red-headed fungus appears in the Bayamon district and is more prevalent there than the white-headed fungus. In the Bueblo Viejo district, however, the white-headed fungus has been observed in greater numbers than the red-headed fungus. It is said that the species that prey upon the purple scale spread very rapidly, whereas those which prey upon the white scale do so very slowly.

Windbreaks are discussed at some length, attention being called to the fact that there is not a grove on the island that does not need in some part more protection from wind than it has at the present time. The several causes of scarred fruit are discussed. Chafing by wind is shown to be an important factor; in one case the windy side of a tree showed 23 scarred and 234 unscarred fruit, while the leeward side showed 7 scarred and 210 unscarred.

Notes on spraying and spraying machinery and an extended discussion of insecticides and fungicides follow.

Notes on some coconut pests, P. L. Guppy (*Proc. Agr. Soc. Trinidad and Tobago, 11 (1911), No. 2, pp. 164–171*).—The data here presented relate to *Brassolis sophoræ*, the spiny coconut caterpillar (*Hyperchiria* sp.), a rhinoceros beetle, and *Rhynchophorus palmarum*, the larva of which is the well-known "gru-gru worm."

Insects injurious to shade trees, J. B. Smith (*Ann. Rpt. Forest Park Reserv. Com. N. J., 4 (1908), pp. 85–100, pls. 8, figs. 4*).—A brief account of the more important insect enemies of shade trees in New Jersey.

Insects of the greenhouse and their extermination, J. J. Davis (*Trans. Ill. Hort. Soc., n. ser., 44 (1910), pp. 32–41*).—The author here considers a few of the more important insect pests that occur in the greenhouse, including the Sciara maggot (*Sciara inconstans*) which attacks cucumbers, the greenhouse white fly, the red spider, cutworms, of which *Peridroma saucia* is the most common, plant lice, thrips, of which *Thrips tabaci* is said to be the most abundant and troublesome in Illinois, the rose or oblique-banded leaf roller (*Cacœcia rosaceana*), and the greenhouse leaf-tyer (*Phlyctænia ferrugalis*).

The mole cricket (Scapteriscus didactylus), A. Fredholm (*Proc. Agr. Soc. Trinidad and Tobago, 11 (1911), No. 2, pp. 153–163; abs. in Agr. News* [*Barbados*], *10 (1911), No. 233, p. 106*).—This is a general account of the life history, habits, and remedial measures for the mole cricket, which in Trinidad takes a prominent place among insect pests, it being the most destructive of those that occur in market gardens. Three of the most common birds in Trinidad, the Savannah blackbird (*Quiscalus crassirostris*), the tickbird (*Crotophaga ani*), and *Lanius pitanga* feed freely on mole crickets and assist in checking more extensive depredations.

Poisoned baits are resorted to as remedial measures.

The Thysanoptera that attack Gramineæ in Russia, D. M. Koboljkow (*Izv. Moskov. Selsk. Khoz. Inst.* (*Ann. Inst. Agron. Moscou*), *16* (*1910*), *No. 3, pp. 192–205, figs. 11*).—This is a report of investigations made of the thrips that attack grains and grasses in Russia. The work, which was conducted in cooperation with N. M. Kulagin, was carried on in the fields of the Moscow Agricultural Institute upon winter rye, wheat, oats, timothy, and other grasses.

Six species were found, namely, *Anthothrips aculeatus*, *Limothrips denticornis*, *Physopus vulgatissimus*, *Aptenothrips rufus*, *A. nitidulus*, and *Chirothrips manicatus*, the first four being the most important. *A. aculeatus* was found to feed on the ripe pollen and deposit its eggs on the flower apophyses.

Investigations of Phlœotribus oleæ, M. Topi (*Atti R. Accad. Lincei. Rend. Cl. Sci. Fis., Mat. Nat., 5. ser., 20* (*1911*), *I, No. 1, pp. 52–57*).—An account of the life history and habits of, and injury to the olive by, the scolytid bark beetle *P. scarabæoides* (*oleæ*).

The apple red bugs, C. R. Crosby and C. S. Wilson (*New York Cornell Sta. Bul. 291, pp. 213–225, pls. 5, figs. 10*).—The capsid bugs *Heterocordylus malinus* and *Lygidea mendax*, to which the common names of apple red bug and false apple red bug, respectively, have been applied, have become a source of injury to apples in New York. Although observed on apples from time to time for a number of years, they did not become of sufficient importance to warrant particular study until the spring of 1908, when a serious outbreak was reported in an orchard at Syracuse, an account of which by M. V. Slingerland has been previously noted (E. S. R., 22, p. 654).

While the most conspicuous work of the red bug is found on the leaves, those that are badly punctured early in the season becoming curled and in some cases dropping off, yet this damage is very slight. A little later the bugs attack the tender leaves at the tips of the growing branches and frequently stop growth by their punctures. The principal injury, however, is caused by punctures in the young fruit. The bristles of the bug's beak penetrate quite to the center of the young apples, the tissue around each puncture becoming discolored and hardened. Many of the punctured apples fall to the ground, others dry up on the trees, while the remainder mature but are badly deformed and rendered unmarketable. Sometimes a drop of gum oozes from each puncture. A grower at Waterloo states that during the past few years the injury in his orchard has amounted to about $1,000 a year, while another at Brockport estimates his yearly loss to be from $300 to $500. In 1909 the presence of aphids in great numbers made any estimate of the extent of red bug injury almost impossible.

Both species are generally distributed throughout the apple-growing sections of the State and the red bug is recorded from Illinois. A species closely related to the red bug, *H. flavipes*, has been recorded by I. Nitobe from Japan, where it is a source of injury. The apple is the only food plant upon which the author has found these two red bugs feeding.

The eggs of both species are laid during late June or early July, being inserted their full length into the bark on the smaller branches, 2-year-old wood being preferred. All eggs definitely known to belong to the red bug were found inserted in a slit in the bark at the base of the fruit spurs, while those of the false red bug are usually inserted in pairs in the lenticels of smooth 2-year-old wood. The eggs of the red bug begin to hatch soon after the leaves of the fruit buds open and hatching is practically complete by the time the blossoms open; those of the false red bug hatch about one week later. Technical descriptions and drawings are given of the five nymphal stages passed by these species. Very soon after hatching the nymphs move to the young leaves on which they feed until full grown in case fruit is not available. Both species were reared to the adult stage exclusively on foliage. Usually when fruit is present the nymphs attack it as soon as set and sting it to death with their feeding punctures.

Attempts made to kill the delicate and tender nymphs at the time of hatching by coating the bark thoroughly with commercial lime-sulphur, diluted 1:8, and applied just before the time of hatching, failed, the nymphs maturing on the trees as abundantly as on those not treated. Experiments conducted in 1909 demonstrated that the nymphs are very hard to kill with either whale-oil soap or kerosene emulsion and that commercial whale-oil soap is very likely to burn young apple foliage. In experiments made in 1909 with commercial lime-sulphur, diluted 1:30, none of the nymphs was killed unless the liquid was applied so freely as practically to drown them.

In 1910 experiments with whale-oil soap and nicotin preparations were conducted on a larger scale. Neither homemade whale-oil soap free from uncombined alkali nor commercial brands were effective in killing the nymphs. Blackleaf diluted 1:65, Nico-fume diluted 1:700, and Blackleaf 40 diluted 1:816 were found effective when the nymphs were thoroughly wet with the spray. The addition of about 2 pounds of soap to each 50 gallons of liquid made it spread better and in a measure it lost its tendency to collect in small drops without wetting the insects. A grower at Waterloo, who used Blackleaf at the rate of 1 gallon in 100 gallons of dilute lime-sulphur to which arsenate of lead had been added reports excellent results in the control of the red bug.

In applying the nicotin preparation the first application should be made just before the blossoms open, while the nymphs are small, soft, and tender. As the eggs of the false red bug and some of those of the red bug hatch during the time the trees are in blossom, a second application may sometimes be necessary just after the blossoms fall, at which time the tobacco preparation may be added to the lime-sulphur and arsenate of lead as used for apple scab and the codling moth.

Harlequin cabbage bug (Murgantia histrionica), R. I. SMITH (*North Carolina Sta. Rpt. 1909, pp. 90–99, fig. 1*).—This is a report of studies of the life history and habits of the harlequin cabbage bug, a paper relating to which has been previously noted (E. S. R., 21, p. 348).

Tabulated records of the oviposition of 14 hibernated individuals show that egg masses are deposited at periods varying from 2 to 15 days, with an average of about one mass every 4 days, 12 being the normal number of eggs in a mass. Eggs deposited the middle of April required an average of 11 days for incubation, while for eggs deposited the middle of May the average was about 6 days.

In hot summer weather, however, they may hatch on the fourth day. The length of life of the 14 hibernated females kept in confinement varied from 22 to 69 days, the last dying on June 11. Ninety-six was about the average number of eggs laid by each hibernating female, the maximum being 179 and the minimum 36.

The usual number of eggs deposited by the second brood is from 72 to 84. There is stated to be a variation in the duration of the young stages particularly in the fourth and fifth instars. The author's records of bugs that hatched on August 24 and 25 showed the life cycle, exclusively of the egg stage, to cover from 57 to 65 days. Three full generations and possibly a partial fourth are all that are produced in the vicinity of Raleigh, N. C. Eggs deposited in the fall too late to hatch or bugs that fail to reach maturity before winter commences, do not live until spring.

On the leaf-hoppers that injure the sugar beet in Bohemia, H. UZEL (*Ztschr. Zuckerindus. Böhmen, 35 (1911), No. 5, pp. 285–292*).—The species here considered are *Cicadula sexnotata, Chlorita flavescens, C. solani, Eupteryx carpini* (=*Typhlocyba picta*), and *Philænus spumarius* (=*Aphrophora spumaria*).

Description of a new coccid species, Ceroputo ambigua, with notes on its life history and anatomy, D. T. FULLAWAY (*Proc. Davenport Acad. Sci., 12 (1910), pp. 223–239, pls. 4*).—It is stated that this scale insect is to be found on the salt marsh grass or pickle weed (*Salicornia ambigua*) that grows on the marshy flats of the bay region in the vicinity of Palo Alto, Cal.

Hæmatopius urius as an agent in the transmission of infectious diseases of the pig, N. BERNAZKY (*Abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 45 (1910), No. 20, p. 614; Vet. Rec., 23 (1910), No. 1149, pp. 37, 38*).—The author observed that upon a farm where hog cholera prevailed the hog louse (*H. urius*) passed from the dead animals to the straw and thence to other pigs. Lice were collected from infected pigs and placed upon 4 pigs of from 10 to 11½ kg. in weight that had been obtained from a region free from swine fever, 19 lice being placed upon each pig.

All of the 4 pigs became ill in from 12 to 14 days, showing diarrhea and becoming emaciated. Two of the pigs died after 17 and 19 days, respectively, while the other two remained alive until the thirty-first and thirty-fifth days after the commencement of the experiment. The autopsies showed lesions of pure hog cholera or alterations due to a mixed infection of hog cholera and of pasteurellosis.

Notes on Chrysopa dorsalis, E. MAUDE ALDERSON (*Ent. Mo. Mag., 2. ser., 22 (1911), No. 255, pp. 49–54, pl. 1, fig. 1*).—An account of the life history and habits of this insect.

Gipsy and brown-tail moth suppression, F. W. RANE (*Ann. Rpt. State Forester Mass., 7 (1910), pp. 65–115, pls. 7, map 1*).—The details of eradication work conducted by the State in 1910 are here reported.

During the year many improvements were made in spraying apparatus and methods, it being found possible for a gang to thoroughly spray as many as 23½ acres of heavy growth in one day. In experiments conducted newly hatched larvæ were caught on tanglefoot and screens at distances varying from 50 to 600 feet, and a single caterpillar upon one screen on May 11 which was 1,833 feet from the point of liberation. "These experiments demonstrated conclusively that small caterpillars of the gipsy moth may be carried by wind. This method of distribution is probably most frequent when the caterpillars are in the first, or possibly in the second stage, at which time they spin large quantities of silk for the purpose of lowering themselves from the trees or foliage. It is probable that these insects are often carried long distances in this way, and that large numbers of them perish every year because they fail to come in contact with suitable food."

Reports by L. O. Howard on Parasite Work (pp. 94–98); by A. T. Speare on The Fungus Diseases of the Brown-tail and the Gipsy Moths (pp. 98–101); and by H. N. Jones on Further Studies on the Nature of the Wilt Disease of the Gipsy Moth Larvæ (pp. 101–105) are also included.

Spraying for codling moth in Galloway orchard (*Oreg. Agr. Col. Bul., 1. ser., 1911, No. 48, pp. 56, 58*).—Tests made of the comparative value of 1, 2, and 3 applications of lead arsenate 1.5:50 are summarized in the following table:

Comparative tests of one, two, and three applications of lead arsenate for codling moth.

Spray.	Times sprayed	Date.	Number of clean apples.	Number of wormy apples.	Per cent wormy.
Arsenate of lead 1.5 50	1	May 12	735	145	16.6
Do	2	May 12, June 21	229	38	14.2
Do	3	May 12, June 21, Aug. 28	619	56	8.2
None	0		1,020	279	21.4

Spraying for the codling moth (*Oreg. Agr. Col. Bul., 1. ser., 1911, No. 48, pp. 29, 31*).—The results of tests made to determine the relative value of one and two sprays in controlling the codling moth, in which 12-year-old trees were sprayed with arsenate of lead 1:50, are summarized in the following table:

Comparative tests of one and two applications of lead arsenate for codling moth.

Spray.	Times sprayed.	Date.	Number of clean apples	Number of wormy apples.	Per cent wormy.
None	0		458	221	32.5
Arsenate of lead	1	June 5	566	154	21.3
Do	2	June 5, July 5	488	78	13.8

History of spraying in the Pajaro Valley, C. W. Woodworth (*Better Fruit, 5 (1911), No. 10, pp. 65–70, fig. 1*).—Much of the data here presented have been previously noted from another source (E. S. R., 24, p. 560). In regard to zinc arsenate the author states that it has proved to be the safest of the arsenicals that can be procured in the form of dry powder, though not as safe as neutral lead arsenate. It is said to have been used without very serious evidence of burning in orchards where dusting has been adopted instead of spraying.

Solving the problem of the codling moth, E. P. Taylor (*Better Fruit, 5 (1911), No. 10, pp. 77–80*).—The author considers the unusually large percentage of wormy fruit in the Grand Valley of Colorado in 1910 to have been due to the comparatively light crop of fruit and the superabundance of worms that hibernated successfully as a result of favorable climatic conditions. In 2 unsprayed orchards examined on June 18, 97.2 per cent of the apples still upon the trees in a Ben Davis orchard and 96.6 per cent in a Winesap orchard were already wormy. In a third unsprayed orchard examined on July 1, 96.8 per cent of the fruit still upon the trees were wormy.

The author again (E. S. R., 18, p. 951) calls attention to the fact that the number of sprays required to control the moth in an orchard will depend principally upon (1) previous infestation of the orchard, (2) proximity to other infested orchards, (3) efficiency of earlier sprays, and (4) the variety of fruit. He considers it folly for anyone to state arbitrarily the exact number of sprays necessary under all conditions to control the codling moth.

Maize stalk borer, Sesamia fusca, C. W. MALLY (*Agr. Jour. Cape Good Hope, 37 (1910), No. 6, pp. 686, 687*).—Notes on the migratory habits of the larvæ are given.

Investigations on the cochylis and eudemis moths (*Rev. Vit., 35 (1911), No. 894, pp. 113–156, pl. 1, figs. 17*).—Papers are here presented on the differential biological characteristics of *Cochylis ambiguella* and *Eudemis botrana*, and their geographical distribution, by J. Feytaud; methods of combating them, by J. Vincens; the destruction of adult moths in Champagne, by P. Dépuiset; preventive treatment in large vineyards, by J. Capus and J. Feytaud; the use of insecticides against the cochylis, by L. Moreau and E. Vinet; the occurrence of these moths in the various Provinces of France; and general conclusions by R. Brunet.

New treatment of the vine cochylis, CATONI (*Feuille Inform. Min. Agr. [Paris], 1910, No. 37; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 179*).—An emulsion consisting of 0.5 kg. of carbon disulphid and 2 kg. of yellow soap in 100 liters of water has been found most efficacious in the destruction of the cochylis. The soap is first dissolved in hot water, the remainder of the 100 liters of water is added cold to the emulsion and the carbon disuphid then added while the mixture is emulsified. This emulsion will penetrate the flowers of the grape where the insect lies hidden.

Nyssomyzomyia rossi and malaria, C. A. BENTLEY (*Paludism [Simla], 1911, No. 2, pp. 35–42*).—From the observations here reported the author concludes that *N. rossi* is naturally refractory to malarial infection, but that this immunity may sometimes be broken down, notably under conditions inseparable from feeding experiments conducted with mosquitoes in captivity.

The seasonal malarial infection of Neocellia stephensi in Bombay, C. A. BENTLEY (*Paludism [Simla], 1911, No. 2, pp. 43–51*).—The author thinks that existing information justifies the conclusion that the infection of malaria-carrying anopheles both as regards zygotes and sporozoits is subject to seasonal variation, that this variation can not be explained on the ground of change of temperature alone, and that careful investigation into seasonal infection of anopheles is required.

[Notes on mosquitoes], S. P. JAMES (*Paludism [Simla], 1911, No. 2, pp. 52–88, pl. 1*).—These notes include provisional lists, etc., of the anophelines known to occur in India, descriptions of a new anopheline and of a new genus and species of culicine, and an account of the development of the egg follicle in anophelines by S. R. Christophers.

Relation of the buffalo or other gnats in Texas to pellagra, F. W. MALLY (*Bul. Tex. Bd. Health, 4 (1910), No. 12, pp. 31–36*).—The greater number of 250 replies received to a letter of inquiry sent out by the author to physicians in Texas show the majority of pellagra cases to be found in counties in which simulid gnats apparently do not occur. There seems to be a practical unanimity among the physicians who have treated pellagra cases that they can not trace any relationship to the agency of the buffalo gnat, even where found in their localities. The gnat-infested districts appear to be largely confined to northeast Texas and counties bordering the Sabine, Neches, and Trinity Rivers, thus being practically confined to the area of greatest rainfall in Texas, while the districts where the greatest number of cases of pellagra are found are in the areas of lesser rainfall to the west.

Experiments to ascertain if certain Tabanidæ act as the carriers of Trypanosoma pecorum, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 565, pp. 349–358, pl. 1*).—"*Tabanus secedens*, *T. thoracinus*, and *T. fuscomarginatus* appeared to be unable to transmit *T. pecorum* from infected to healthy cattle by the mechanical method of transmission. Owing to the short life of these tabanids in captivity it is impossible, from the above experiments, to state whether they can convey the disease (*T. pecorum*) after a period of development of the trypanosome in the fly. We believe the three types of flagellates found in *T. secedens* and *T. thoracinus* to be various stages in the development of a harmless Crithidium in these flies."

Experiments to ascertain if Trypanosoma gambiense during its development within Glossina palpalis is infective, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 565, pp. 345–348*).—"*Trypanosoma gambiense* may retain their virulence, as ascertained by direct inoculation into susceptible animals, for a period of 2 days after they are ingested by *G. palpalis*. After the trypanosomes have been within the gut of the fly for 2 days the power of infecting animals with sleeping sickness, when inoculated subcutaneously, is lost for a period of 22 days. *T. gambiense* regains the power of infecting by direct inoculation after it has been about 24 days within the intestine of the fly. The number of days during which the virulence of the trypanosomes contained in the fly is lost roughly coincides with the time that the infected fly is incapable of transmitting sleeping sickness by biting susceptible animals. There is some evidence that the salivary glands of the fly are invaded by virulent forms of the parasite 36 days after the fly has fed upon infected blood."

Experiments to investigate the infectivity of Glossina palpalis fed on sleeping sickness patients under treatment, D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 565, pp. 338–344*).—It was found that *Glossina palpalis* fed on natives suffering from sleeping sickness, whether untreated by drugs or treated by arsenic and other drugs, may become infected and be capable of transferring the disease to healthy animals.

Remarks on the egg-laying of Stomoxys calcitrans and rearing the larvæ of Muscidæ, M. LANGERON (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 28, pp. 230, 231; abs. in Jour. Trop. Vet. Sci., 6 (1911), No. 1, pp. 60, 61*).—The author finds that boiled bran forms a very good medium for the development of the larvæ of the Muscidæ. It must be kept moist and the light excluded.

Third report on flies as carriers of infection (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Subjs., n. ser., 1910, No. 40, pp. 48, pls. 7, figs. 3*).—Three papers are here presented, namely, Observations on the Ways in which Artificially-infected Flies (*Musca domestica*) Carry and Distribute Pathogenic and other Bacteria, by G. S. Graham-Smith (pp. 1–40); Summary of Literature Relating to the Bionomics of the Parasitic Fungus of Flies, *Empusa muscæ*, with Special Reference to the Economic Aspect, by J. Bernstein (pp. 41–45); and Note as to Work in Hand, but not yet Published, and as to Proposed Further Work in Reference to Flies as Carriers of Infection, by S. M. Copeman (pp. 45–48).

The experiments conducted by Graham-Smith show that nonspore-bearing bacteria frequently survive for several days in the crops of flies and that after a meal flies may regurgitate some of the contents of their crops through the proboscis. "A fly which has access to abundant food produces between 15 and 30 deposits (vomits and feces) in 24 hours . . . Experiments with *Bacillus prodigiosus* show that flies may infect sugar 48 hours after feeding on infected material, and that clean flies may infect themselves by feeding on the recent deposits of infected flies. In the few experiments which were tried, milk and meat were not infected. Flies fed on anthrax spores did, however, infect the sirup which was given to them as food."

Notes on fruit flies (Trypetidæ) with descriptions of new species, W. W. FROGGATT (*Proc. Linn. Soc. N. S. Wales, 35 (1910), pt. 4, pp. 862–872*).—In this paper the author presents further information upon fruit flies (E. S. R., 22, p. 559). Seven species are described as new to science, namely, a mistletoe fruit fly (*Ceratitis loranthi*), bred from fruits of *Loranthus pendulus* on *Eucalyptus* sp. in West Australia; *Dacus kingii*, bred from the fruits of the usher tree (*Calatropis procera*) in Khartum; *D. pepisalæ* from the Russell Group of Solomon Islands; *D. passifloræ*, bred from Granadilla fruits and mangoes, New Zealand; *D. tongensis*, bred from mangoes imported into New Zealand; *D. rarotongæ*, bred from mangoes in Rarotonga, Cook Islands; and *D. kirki*, bred from peaches and from island fruit imported into New Zealand.

The French bean fly, Agromyza phaseoli, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 22 (1911), No. 2, pp. 151–154, pl. 1*).—An account is given of the life history and remedial measures for this leaf-mining fly, which, though apparently a native of Australia, was not recorded until 1898, in which year it injured bean plants in the vicinity of Erina and Wamberal. It was the source of serious injury in 1910, having spread over a much larger area than that occupied in former years.

The danger of transporting plague long distances through the intermediation of the flea, A. RAYBAUD (*Presse Méd. [Paris], 1911, No. 19, pp. 179, 180; abs. Jour. Amer. Med. Assoc., 56 (1911), No. 15, pt. 2, p. 1152*).—The author calls attention to the fact that since plague germs may remain virulent in the rat flea (*Ceratophyllus fasciatus*) during hibernation for a period of from 1 month to 45 days, the disease may be conveyed long distances in this manner. He suggests that when the fleas leave the bodies of animals which have succumbed to plague they may seek refuge in bales of goods or cracks of boxes and live there at a temperature which renders them torpid, practically hibernating, while the plague germs maintain their vitality and virulence.

Researches on the Ascaridæ of Carnivora, A. RAILLIET and A. HENRY (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 1, pp. 12–15*).—The authors recognize 2 genera of ascarids that are parasitic in Carnivora, namely, Belascaris and Toxascaris, both of which were described by Leiper in 1907. Five species are described as belonging to the former genus Belascaris and three to the latter. *B. mystax* is parasitic in the cat and other Felidæ and *B. marginata* and *T. limbata* n. sp. in the dog.

Technical papers on miscellaneous forest insects, III.—A revision of the powder-post beetles of the family Lyctidæ of the United States and Europe, E. J. KRAUS (*U. S. Dept. Agr., Bur. Ent. Bul. 20, tech. ser., pt. 3, pp. 111–138*).—In this paper the author points out the more prominent specific characters and gives the range of variation within the species. Following a brief introduction he deals with the history of the family Lyctidæ and the three genera recognized as belonging to it (Lyctus, Lyctoxylon, and Minthea), the principal characters of the family, synopsis of the genera, revisional notes, and synopsis of species of the genus Lyctus. Systematic notes are given on 14 species of Lyctus, of which one, *L. politus*, reared from licorice at Washington, D. C., is described as new, also on one species of Lyctoxylon and 2 species of Minthea. A bibliography of 61 titles is included.

In an appendix (pp. 130–138) A. D. Hopkins presents notes on habits and distribution and a list of the described species of this family, 89 species of Lyctus, 2 of Lyctoxylon, and 2 of Minthea being listed.

"So far as known, the species of the family Lyctidæ live in dead and dry wood of natural growth, in the seasoned sapwood of commercial products, and in the pith of vines and the dried roots of herbaceous plants, but do not infest the wood of coniferous trees. Some of the species appear to prefer the dead and dry wood of standing trees, shrubs, and vines under natural conditions, and therefore are rarely found in the commercial articles; for this reason they are not subject to temporary or permanent removal from the natural range of the species. The other species, which infest commercial products, are subject to wide distribution over the world."

A new species of Eccoptogaster, J. M. SWAINE (*Canad. Ent., 42 (1910), No. 2, pp. 33–35, pl. 1*).—*Eccoptogaster piceæ* n. sp., collected at Hudson, Quebec, in branches of *Piceæ canadensis*, is reported to be the first species of this genus of beetles recorded from conifers in eastern North America.

The unknown snout beetle or bud weevil, G. CHASE (*Better Fruit, 5 (1911), No. 10, pp. 93, 94*).—The author reports that in March, 1910, an undetermined species of weevil, which he had first observed in 1909 attacked all of the trees in an orchard of over 16,000 at Prosser, Wash. Good results were obtained from the application of kerosene emulsion in early March to the soil about the trees, where the weevils gathered in numbers varying from 12 to 50 to a tree. Thus far the author has found this weevil only on 1-year-old trees in soil that had been cleared from sagebrush two years previous.

The apple blossom weevil, N. JACHONTOFF (*Izv Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou), 16 (1910), No. 3, pp. 229–254, figs. 5, dgm. 1*).—The author reviews the literature relating to the natural history of *Anthonomus pomorum*, records observations made personally in the gardens of the Moscow government and of the Moscow Agricultural Institute, and discusses remedial measures.

In 1909 weevils that mated on April 22 oviposited from May 11 to 16; the first nymphs appeared May 31 and the first adults on June 15. The species is quite widely distributed in Russia, especially in the southern and central parts of the country, where the injury caused by the larvæ to the flower buds sometimes rises as high as from 50 to 75 per cent.

A bibliography of 42 titles is appended.

The occurrence of bee diseases in the United States, E. F. PHILLIPS (*U. S. Dept. Agr., Bur. Ent. Circ. 138, pp. 25*).—In this preliminary report the information at hand on the occurrence of American and European foul brood in this country is listed by States and counties. Although most of the data were obtained by correspondence, the records are based on examinations made in the bacteriological laboratory of the Bureau, in all 1,800 samples having been examined. The counties from which satisfactory samples have not been received but from which information of the presence of the disease has been received from an apiary inspector or beekeeper thought to be conversant with the disease are listed as "suspected." Foul brood is known to occur in 416 of the 2,932 counties, American foul brood occurring in 294 and European foul brood in 165.

For the information of beekeepers a brief statement is made concerning the apiary inspection in each State where it is provided by law.

A supposed occurrence of Anagrus incarnatus in the United States, A. A. GIRAULT (*Ent. News, 22 (1911), No. 5, pp. 207–210*).—The species *A. spiritus*, here described as new to science, is supposed to have been reared from the apple aphis.

Compressed air spraying, J. W. STEWART (*Amer. Agr., 87 (1911), No. 17, p. 656, fig. 1*).—The author, who has used compressed air in large orchards in Berkeley County, W. Va., during a period of five years, here discusses its advantages and disadvantages. While not recommended for use in orchards that are not of sufficient size to warrant an expenditure of $1,000 for spraying outfits, he considers the compressed air equipment to be a necessity in large orchards.

FOODS—HUMAN NUTRITION.

Foods and their adulteration, H. W. WILEY (*Philadelphia, 1911, 2. ed., rev. and enl., pp. XII+641, pls. 11, figs. 87*).—The author states that the text of this handbook (E. S. R., 18, p. 1064) has been revised and statistical matter brought up to date. The regulations for inspection and the rules and regulations for the enforcement of the food and drugs act have been omitted and the space thus saved has been devoted to the expansion of the article on infants' and invalids' food and to a new section given to simple tests, such as may be practiced with some degree of success in the household, for detecting ordinary adulterations.

The section on infants' and invalids' foods discusses such questions as infant dietetics and substitutes for mother's milk, sour milk and longevity, meat extracts and other meat preparations, diet in obesity and tuberculosis, and other questions of invalid dietetics, and gives a compilation of analyses of infants' and invalids' foods, particularly proprietary articles and commercial products.

The meat industry and meat inspections, G. R. LEIGHTON and L. M. DOUGLAS (*London, 1910, vols. 1, pp. XVI+332, pls. 10, figs. 246, dgms. 3, chart 1; 2, pp. VIII+333–735, pls. 10, figs. 334, dgms. 48; 3, pp. VIII+737–1088, pls. 26, figs. 195, dgms. 2; 4, pp. VII+1089–1412, pls. 4, figs. 29, dgms. 3; 5, pp. VII+1413–1720, pls. 6, figs. 93, dgms. 24*).—This series of volumes is designed to give a comprehensive account of the domestic animals, game, poultry, and fish supplied to the British meat market, together with a description of the industrial processes connected with the meat industry and the scientific inspection of meat.

The first volume is concerned with the breeding and feeding of domestic animals, bacon and ham curing, fish and fish markets, the handling and inspection of fish, and similar topics, while the second volume has to do with abattoirs, the meat trade, refrigeration, the handling of meats, the chemistry and cooking of meat, the relative value of fresh and cold storage meat, the pickling of meat, and related topics. The remaining volumes are devoted to questions of slaughtering, meat inspection, and other such topics.

Edible frogs, I. H. BURKILL (*Agr. Ledger, 1911, No. 2 (Anim. Prod. Ser., No. 4), pp. 11–15*).—Descriptive data are given regarding frogs used as food in India.

The influence of the combined harvester on the value of the wheat, R. STEWART and C. T. HIRST (*Utah Sta. Bul. 113, pp. 165–177, figs. 3*).—Owing to the belief that wheat harvested with the combined harvester yields grain of inferior quality, the matter was studied by comparing Turkey and Kofod wheats thus harvested with samples cut with a binder and stacked for six weeks before thrashing.

As shown by data collected regarding the yield of milling products, the composition of the wheat, flour, bran, and shorts, and the bread-making quality of the flour, no differences were observed which could be attributed to the method of harvesting. From the recorded data it was apparent that the Turkey Red wheat was distinctly superior to the Kofod for bread-making purposes, and the authors are of the opinion that since the complaints have been greatest from the sections where the Kofod wheat is largely grown, the obvious remedy is to grow Turkey wheat, as this gives a larger crop and a better yield of flour, which is richer in protein, absorbs the greater amount of water, and makes a loaf of greater volume.

Keeping qualities of wrapped and unwrapped bread, H. E. BARNARD (*Bakers' Helper, 24 (1910), No. 280, pp. 738, 739*).—Studies are reported of the keeping quality of bread of different kinds wrapped in paraffin paper and in ordinary porous paper.

In general, the ordinary loaf when wrapped in paraffin paper remained in good condition for three or four, and in some cases for five days, while the unwrapped loaf became dry and stale at the end of two days. Loaves wrapped in porous paper dried out more rapidly but showed less tendency to become sour. Vienna bread and rye loaf bread lost their natural characteristics rapidly when wrapped, since the moisture in the center became evenly distributed throughout the loaf, thus destroying the flavor and texture of the crust. It was also found that after four or five days the ordinary wrapped loaf became unpalatable, through an increase of acidity, and furthermore, that such bread would eventually mold.

As a whole, the author believes that the experimental evidence is in favor of wrapping bread, "and since the ordinary unwrapped loaf is now considered unsalable at the end of the second day, the use of the wrapper at least doubles the period during which it is merchantable."

Tests of bread wrapping, C. A. A. Utt (*Bul. Bd. Health, 7, (1911), No. 3, pp. 52–60*).—In tests reported in continuation of work noted above different kinds of bread were kept for four or five days. In general, the unwrapped loaf lost about twice as much moisture as the wrapped loaf, while the acidity remained practically the same. The wrapped bread was in edible condition for twice its ordinary period.

"Leaving out the purely sanitary reasons, which after all are the greatest, for wrapping bread, our results, if properly interpreted, can only argue in its favor.

"If bread is only warm when wrapped it keeps better; it does not get moldy; the acidity does not increase any more for the wrapped than the unwrapped loaf; the crust softens, but does not get tough; it does not injure the flavor; the moisture becomes uniformly distributed, resulting in a much better loaf."

Letters received from Kansas bakers in reply to a circular inquiry showed that those "who have tried bread wrapping favor it, and that their sales have increased. The opposition displayed in many letters is evidently due to ignorance."

The digestibility of vegetables in health and disease and the effect of the stomach in disintegrating vegetable materials, A. Schmidt (*Deut. Med. Wchnschr., 37 (1911), No. 10, pp. 435–438; Jour. Amer. Med. Assoc., 56 (1911); No. 15, p. 1154*).—On the basis of his own studies and those of other investigators, the author discusses the digestibility of raw and cooked vegetables, particularly the effect of the stomach upon the digestion of such materials. His general conclusion is that the pepsin-hydrochloric acid, when the action is continued for a sufficient time, causes the vegetable substances to swell and soften in such a way that they may be acted upon subsequently by gastric juice.

The author was unable to discover any evidence to sustain the assumption that the digestion of vegetables occurs chiefly in the intestines and that it is due mainly to the work of microbes.

Changes in the constituents of peas soaked and cooked in water and in solutions of sugar and salt, E. Poppe (*Bul. Soc. Chim. Belg., 25 (1911), No. 3, pp. 136–145*).—In the experiments reported dried peas were soaked for varying lengths of time in distilled water and in saturated, one-half saturated, and one-fourth saturated solutions of common salt and of sugar, at different degrees of temperature, with a view to determining the amount of nitrogenous material, phosphates, chlorin, and carbohydrates removed.

It was found that the loss of nitrogen was greatest with distilled water and least with the saturated solution of salt, and that in general a high temperature favored extraction of nitrogenous substances and phosphates. The largest amount of chlorin was extracted with water at a temperature of 100° C. Distilled water at 100° C. removed some carbohydrates from the peas, but this was not the case with the saline solution. In general, the amount of material extracted seemed to depend on the concentration of the solutions rather than on the temperature.

Both the concentration and the temperature influenced the amount of the solution absorbed by the peas. The author believes that the variations observed are due to differences in the properties of living cells as contrasted with those in which protoplasm has been destroyed.

Some investigations concerning the keeping qualities of sugar sirups, fruit sirups, and crushed fruits, H. E. BARNARD and I. L. MILLER (*Ann. Rpt. Bd. Health Ind., 28 (1909), pp. 331–352, charts 8*).—In this investigation 296 samples of crushed fruits, fruit sirups, sugar sirups, and concentrates were studied with special reference to factors affecting keeping quality in their commercial use in the soda-water trade.

According to the authors' conclusions, the results obtained indicate that concentrated crushed fruits and fruit sirups such as are marketed in tins, etc., may be kept without loss for from one to three months after opening when kept at a temperature below 50° F., and that soda-water-fountain sirups made up with 14-pound sugar sirup will keep from two to four weeks without the slightest evidence of fermentation. They conclude further "that crushed fruit concentrates diluted with sugar sirup of 14 pounds to the gallon strength will keep when exposed at room temperature from three to ten days, and when goods are placed in the refrigerator of the fountain during the nighttime for a period of eight hours, the time during which they keep in good condition is nearly doubled." "The keeping quality of crushed fruit and fruit sirups is influenced materially by the concentration of the sugar solution used as diluents. While in most instances a 10-pound sirup is sufficient to hold the goods for a period long enough to allow of their disposal, yet concentrates which are from 12 to 16 pounds materially improve the keeping qualities of the goods From our experiments it appears that a 14-pound solution is best adapted for use, although a saturated sugar sirup which contains about 16 pounds to the gallon of water can always be employed with good results."

The authors also conclude from their investigations that sugar sirup may be best prepared by dissolving the sugar in hot water. "If tap water or unsterilized water is used, the sirup should be brought to 100° C. While sugar sirups made up in the cold are in most cases satisfactory, yet it is evident that they may contain mold spores, which injure the keeping quality of the preparation."

The occurrence of micro-organisms in the interior of meat, potatoes, and sausage, E. MAUREL (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 7, pp. 241–244*).—In all the samples examined the author found a diplococcus.

[Food analyses], H. H. MANN (*Ann. Rpt. Dept. Agr. Bombay, 1909–10, pp. 46–48*).—A number of foodstuffs were examined. The author reports the composition of banana or plantain flour. Though a considerable amount of this could be produced, he states that as yet it has not been possible to find a market for it.

Quantitative aspects of nutrition, H. C. SHERMAN (*Teachers Col. [N. Y.] Bul., 2. ser., 1911, No. 15, pp. 16*).—Factors which affect food requirements, the characteristics of different nutrients, including mineral constituents, and similar questions are considered in this useful summary of the subject, particularly in its quantitative relations.

The feeding of young children, MARY S. ROSE (*Teachers Col. [N. Y.] Bul., 2. ser., 1911, No. 10, pp. 10*).—This pamphlet, which gives practical directions as well as general information, was prepared especially for the committee on foods and feeding of the Child Welfare Exhibit, New York, 1911.

Experiments on the effects of animal protein on vegetarians, P. ALBERTONI and F. ROSSI (*Arch. Expt. Path. u. Pharmakol., 64 (1911), No. 5-6, pp. 439-455*).—Continuing experiments previously reported (E. S. R., 20, p. 965), the authors carried on tests in which meat (at first 100 gm. and later 200 gm.) and eggs (at first two and later four) were added to the daily food of persons accustomed to a strict vegetarian diet. In the experiments with meat, the usual diet supplied on an average, in round numbers, 75 gm. protein per day, the diet with a small amount of meat 98 gm., and that with a larger amount 118 gm., the energy values being, in round numbers, 3,035, 3,283, and 3,331 calories, respectively. In the experiments with eggs, the usual diet supplied, in round numbers, 67 gm. protein, the diet with two eggs 79 gm., and that with four eggs 83 gm., the energy values being 2,686, 3,060, and 2,899 calories, respectively. The balance of income and outgo of nitrogen and phosphorus was determined and dynamometer tests were made.

The authors state that the addition of animal food to the diet influenced favorably the work of the intestines and led to a gain in nitrogen and to gains in body weight. The individuals also gained in strength and in the hemoglobin content of the blood. These results, like those obtained in their earlier experiments, they attribute to the increased protein metabolism, and especially to the addition of animal protein to the diet.

In their general discussion they point out that many persons undoubtedly eat too much and others too little. On the whole, they believe that while it is possible to maintain life on from 40 to 50 gm. protein a day, yet they do not think that on such a diet man is in better condition for the production of energy, and they consider that an abundance of protein, especially of animal origin, has a favorable effect.

Discussion on food requirements for sustenance and work, C. H. MELVILLE (*Brit. Med. Jour., 1910, No. 2600, pp. 1337-1341*).—The test reported was made with 20 infantry soldiers from 18 to 38 years of age and weighing on an average 64.15 kg. On six consecutive days they marched on an average from 12 to 13 miles, carrying a load of 54 lbs. (24.55 kg.). Then after a day's rest the marching was continued for five more days.

According to the author's calculations, the work was equivalent to 1,034 calories per day, or to approximately 90 calories per mile of ordinary road. He estimates further that the internal muscular work and the external muscular work during nonmarching hours were equivalent to 3,000 calories, which would make the total work 4,034 calories per day.

The food consisted of bread, meat, potatoes, jam, and sugar, with tea, condiments, etc. During the first week the diet supplied 190 gm. protein and 3,426 calories per man per day, and during the remainder of the time 145 gm. protein and 3,503 calories. The average for the whole period was 168 gm. protein, 84 gm. fat, and 480 gm. carbohydrates per day, the energy value being 3,481 calories.

During the first three days of the test there was an average gain of 0.55 kg. in weight, followed by a period of two days during which the weight remained stationary. After this, with the exception of a slight rise on the day following the day of rest, the weight diminished steadily until the end of the experiment, the average decrease being 1 kg. for the whole period. The officers accompanying the party were restricted in their diet in the same way as the men, and similar changes were noticed in their body weight. The increase in weight at the beginning of the period is due, in the author's opinion, to retention of water in the system. In discussing changes in body weight, the author calculates that the daily loss was represented by about 60 gm. of body fat and 170 gm. of flesh.

The author states that during the period the weather was very bad, and the men were subjected to the hardships of camp life in bad weather.

As regards the adequacy of the diet, he considers the energy value somewhat too low, since it was smaller than the calculated energy expenditure. He considers that the protein supply during the first week was certainly ample, and possibly larger than was necessary, and that the substitution of some fat for part of the protein would have been an advantage. He believes that the average amount, 145 gm. per day, supplied in the form of fresh meat and bread, was as low "as it is advisable to go, and might well be increased, especially when hard work is demanded of men under conditions of exposure."

The paper was followed by a discussion, in which R. Hutchison, among others, participated. He agreed with the author "that the protein ration was none too high, for whatever views one might hold as to the protein requirements of the body, all careful investigations had shown that there was an instinctive consumption of large quantities when hard muscular work had to be done."

The influence of the preceding diet on the respiratory quotient after active digestion has ceased, F. G. BENEDICT, L. E. EMMES, and J. A. RICHE (*Amer. Jour. Physiol., 27 (1911), No. 4, pp. 383–405*).—Both the small respiration apparatus and the respiration calorimeter of the Carnegie Nutrition Research Laboratory were used in the experiments reported, which were made with a number of subjects, diets both rich and poor in carbohydrates being compared.

In general, the conclusion was drawn that the respiratory quotient determined 12 hours after a meal rich in carbohydrates was higher than when the last meal contained only a small amount of carbohydrates. The possibility of this high respiratory quotient being due to the delayed absorption and combustion of carbohydrates in the alimentary tract is discussed, but the authors believe that the evidence is rather against the theory.

"Obviously the previous body condition plays a very important rôle. The extent to which the body storage of glycogen has been drawn upon, the muscular activity of the day previous to the experiment, possibly the temperature of the surrounding air, the general diet of the individual for several days before—in fact, anything which contributes to a disturbance of the storage of glycogen in the body—may alter the influence of the ingestion of a carbohydrate-rich meal. If the glycogen storage in the body is at a low point, the ingestion of a carbohydrate-rich meal does not result in an increased respiratory quotient in accordance with the amount ingested, as a not inconsiderable proportion of the carbohydrate may be stored immediately as glycogen. Until this glycogen storage has been replenished the combustion of carbohydrate in the food may be delayed. On the other hand, with individuals subsisting without food and remaining quiet in a respiration chamber, the store of glycogen may last for some time. From these data we may infer, then, that muscular activity may play an important rôle in affecting the storage of glycogen."

Other questions which have to do with the general subject are discussed.

Fasting studies.—III, Nitrogen partition of 2 men through 7-day fasts following the prolonged ingestion of a low protein diet; supplemented by comparative data from the subsequent feeding period, P. E. HOWE, H. A. MATTILL, and P. B. HAWK (*Jour. Amer. Chem. Soc., 33 (1911), No. 4, pp. 568–598*).—One of the subjects included in this investigation had been living for a long time on a low proteid diet containing meat, and the other on a low proteid nonflesh diet. The fasting period covered 7 days during which the subjects received daily a constant quantity of water.

Some of the authors' conclusions follow:

"With both subjects the excretion of total nitrogen during the fast remained above the plane of the normal preliminary feeding period, with the exception of the first day of fasting. This unique finding we have interpreted as being due to the fact that the subjects began the fast from a low protein plane. In spite of this unusual condition as regards nitrogen output, however, the nitrogen excretion on the seventh day was very close to that for the seventh day of fasting men as determined by other investigators, i. e., 10 gm.

"The largest water ingestion was not followed by the most complete elimination by the kidneys. A subject ingesting 1,750 cc. per day eliminated 12 to 35 per cent less than a subject ingesting only 1,500 cc. per day.

"[There was] a decrease in body weight, aggregating 7.44 per cent for one subject and 7.62 per cent for the other subject.

"No discomfort [was noted] with the exception of a slight feeling of hunger on the first or second day."

When food was taken subsequent to the fasting, it was accompanied by "a marked retention of water during the first two days, and a pronounced retention of nitrogen from the second to the sixth day inclusive."

On the fourth day there was a return to normal nitrogen metabolism as indicated by the nitrogen partition. "This return to the normal was preceded by an extremely excessive output of ammonia upon the third day. The return to the normal we have interpreted as having been brought about simply through the ingestion of nutritive material, the character of the diet having no important bearing.

"It was necessary to place the subjects upon a higher nutritive plane after the fast than before the fast in order to maintain body weight and nitrogen equilibrium."

The stimulation of gastric secretion under the influence of water drinking with meals, F. WILLS and P. B. HAWK (*Abs. in Jour. Biol. Chem., 9 (1911), No. 2, pp. XXIX, XXX; Proc. Amer. Soc. Biol. Chem., 2 (1910), No. 1, pp. 23, 24*).—Two men brought to a condition of nitrogen equilibrium on a diet with a low water content were given at meal time extra volumes of water, ranging from 1,500 to 4,000 cc.

"During the periods of increased water ingestion there was in each instance an increase in the ammonia excretion which was directly proportional to the extra volume of water ingested. This finding was interpreted as indicating that the water ingestion had stimulated the flow of gastric juice, thus causing the production of a greater quantity of hydrochloric acid than could be neutralized by the customary means. . . . If we calculate the increased ammonia excretion, on the basis of a 100 cc. increase in the water ingestion we find that the excretion was a trifle higher during moderate water drinking than during copious water drinking. This would indicate that after a certain limit had been reached in water ingestion each succeeding 100 cc. of water was less efficient as a stimulating factor than were the 100 cc. portions ingested before the limit above mentioned had been reached."

The utilization of ingested fat under the influence of copious and moderate water drinking with meals, H. A. MATILL and P. B. HAWK (*Abs. in Jour. Biol. Chem., 9 (1911), No. 2, p. XX; Proc. Amer. Soc. Biol. Chem., 2 (1910), No. 1, p. 14*).—Experiments were made with man on a uniform diet, a period in which large amounts of water were taken being preceded and followed by a period in which smaller amounts of water were ingested.

"When 1 liter of water was taken with each meal, the average daily excretion of fat was much reduced, and a similar but less marked reduction was observed when 500 cc. of water was taken.

"The better digestion and absorption of fat was probably due to any or all of the following factors: (1) Increased secretion of gastric juice and, independently, of pancreatic juice; (2) increased acidity of the chyme bringing about more active secretion of pancreatic juice and bile; (3) increased peristalsis due to larger volume of material in the intestine; (4) increased blood pressure due to rapidly absorbed water; (5) more complete hydrolysis by lipase because of increased dilution."

The effects of various forms of exercise on systolic, diastolic, and pulse pressures and pulse rate, O. S. Lowsley (*Amer. Jour. Physiol., 27 (1911), No. 5, pp. 446–466, dgms. 5*).—In the investigations reported the author has studied the effect on the heart of different kinds of exercise.

Quotations from his conclusions follow:

"Pulse rate, which always increases during exercise, decreases rapidly after its completion. This drop in the curve of the pulse rate is frequently followed by a secondary rise which is possibly a reflex effect due to the low blood pressure of the subnormal stage. In no case was it observed that this secondary rise was accompanied by a rise in blood pressure.

"Rapid exercises (vigorous, fatiguing, and exhausting) are followed by a fall of pressure below normal which lasts longer than after moderate exercise, even if the former is continued for a very short period and the latter for quite a long period of time. If we consider the subnormal phase as indicative of an overstrain following upon the great reflex excitation of the heart and vasomotor center, then it would seem that after these so-called rapid exercises the strain is more serious, as is shown by the much longer time required before the conditions return to their normal level.

"If our interpretation of the subnormal phase is correct, it would follow that the so-called field events, consisting of jumping, shot putting, discus and hammer throwing, and baseball, gymnasium apparatus work, and exercises of a similar nature, are preferable to rapid exercises, such as basket ball, football, and running races. This is particularly true in the case of the rapidly growing youth, whose heart is under the additional demand of keeping pace with an increase in the tissue mass of the body.

"There is less strain put upon the circulatory system by walking a number of miles at a moderate rate than by sprinting 100 yards at top speed. This conclusion follows from the fact that blood pressure returns to normal after moderate exercise in about 30 minutes, while after short sprints the subnormal stage continues about three times as long.

"Long-distance running races and similar forms of exhaustive exercise give rise to a serious strain on the heart, as is indicated by the long period of subnormal blood pressure.

"It would seem probable that in individual cases the beneficial or injurious effect of any given form or amount of exercise might be determined by observations upon the subnormal phase following the exercise. When the subnormal phase returns to normal within 60 minutes, the exercise may be considered as lying well within hygienic limits for that individual, while a return that is delayed beyond 120 minutes may be regarded as exceeding these limits."

Law of the body expenditure following work, J. Amar (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 21, pp. 952–954*).—The author has studied the rate of recovery after exercise in experiments with man. The exercise was performed on a bicycle ergometer, and the respiratory exchange was determined. He believed that the oxygen consumption may be regarded as a measure of the body expenditure and that the changes after work should follow Newton's laws for cooling bodies, but, as was shown by experimental evidence, such was not the case.

The man-machine—the remarkable perfection of the human system as a mechanism, J. B. Huber (*Sci. Amer., 104 (1911), No. 3, pp. 60, 72, figs. 4*).—An illustrated description of apparatus and methods used in J. Amar's experiments noted on page 269.

Man's power—testing the energy expended by the human machine (*Illus. London News [Amer. Ed.], 48 (1911), No. 1238, p. 107, figs. 2*).—See page 269.

The respiratory exchange as affected by body position, L. E. Emmes and J. A. Riche (*Amer. Jour. Physiol., 27 (1911), No. 4, pp. 406–413*).—In general, the authors found that the pulse rate lying down was on an average 63, the carbon dioxid excretion 209 cc., and the oxygen consumption 236 cc. per minute. With a subject in a sitting position the pulse rate was 71, the carbon dioxid excretion 218 cc., and the oxygen consumption 254 cc. per minute.

"Inasmuch as the oxygen consumption is commonly considered as the best index of metabolism, it is seen that our experiments indicate an increase in metabolism amounting to 8 per cent" when the metabolism in the sitting position is compared with that when the subject is lying down.

In their discussion of the data reported the authors point out that for experimental purposes, when metabolism at a given condition of body rest is to be determined, it is of value to know, "as a result of experiments with the respiration apparatus, that the metabolism of a subject when sitting absolutely quiet in a chair, without extraneous muscular activity, represents a metabolism 8 per cent greater than that of a subject lying on a couch, with similar muscular rest. The difference in metabolism is then due, primarily, to the difference in the internal muscular activity necessitated by the sustaining of body parts. This is in conformity with the well-known fact that the pulse rate of an individual when sitting is always noticeably higher than when he is lying down. From these tests we could infer that if it were possible to so support the body of the subject in a sitting position that the pulse rate would be no greater than when the subject was lying down, the metabolism would be essentially the same in both positions."

Does lecithin influence growth? A. J. Goldfarb (*Arch. Entwickl. Mech. Organ., 29 (1910), No. 2, pp. 255–274*).—The author's conclusions, from a series of experiments with small animals (tadpoles and frogs, sea urchins' eggs, kittens, and guinea pigs), show that there is no clear evidence of growth stimulation as a result of the administration of lecithin.

The influence of cold baths on the glycogen content of man, G. Lusk (*Amer. Jour. Physiol., 27 (1911), No. 5, pp. 427–437*).—The experiments reported were made with the aid of the small apparatus for studying the respiratory exchange devised by F. G. Benedict and previously noted (E. S. R., 21, p. 665).

The conclusions drawn by the author follow:

"Immersion of normal men in cold baths at a temperature of 10° when the intestine is free from carbohydrates induces shivering, which causes a rapid utilization of body glycogen, as determined by a fall in the respiratory quotient to the fasting level. In one very muscular individual this result could not be obtained.

"In one individual in whom the shivering had been severe, a quotient of 0.67 and another of 0.62 were found during subsequent periods of rest, which correspond to those observed during rest after a period of exhaustive exercise (glycogen formation from protein).

"The greatest increase in heat production which was brought about by the cold baths was 181 per cent above the normal. The urine remained free from albumin and from sugar."

On the question whether dextrose arises from cellulose in digestion, G. LUSK (*Amer. Jour. Physiol., 27 (1911), No. 5, pp. 467, 468*).—The author briefly summarizes data accumulated in connection with some of his earlier experiments, which support the contention that sugar does not arise from the digestion of cellulose.

Mucic acid and carbohydrate metabolism, L. B. MENDEL and W. C. ROSE (*Abs. in Jour. Biol. Chem., 9 (1911), No. 2, p. XII; Proc Amer. Soc. Biol. Chem., 2 (1910), No. 1, p. 6*).—From experiments with animals the authors concludes "that mucic acid is presumably not an intermediary oxidative product in the metabolism of galactose or galactose-yielding carbohydrates. The urinary oxalic acid is only very slightly increased after the ingestion of large amounts of mucic acid. This increase is by no means as large as would be expected if mucic acid were a precursor of oxalic acid."

On creatinin metabolism, C. VOEGTLIN and CAROLINE B. TOWLES (*Abs. in Jour. Biol. Chem., 9 (1911), No. 2, pp. XI, XII; Proc. Amer. Soc. Biol. Chem., 2 (1910), No. 1, pp. 5, 6*).—From the data obtained with dogs and birds the conclusion is reached that the liver can hardly be supposed to occupy an important place in creatinin metabolism, as has been claimed by some investigators.

The sulphur balance in metabolism, A. E. TAYLOR (*Abs. in Jour. Biol. Chem., 9 (1911), No. 2, pp. IX, X; Proc. Amer. Soc. Biol. Chem., 2 (1910), No. 1, pp. 3, 4*).—The balance of income and outgo of sulphur was determined with six normal men for periods of nearly three months, with the object of ascertaining the relations of the sulphur balance. A condition of equilibrium was not observed, the output being regularly and notably higher than the intake. The author does not consider that the results obtained are trustworthy, the presumption being that errors were involved in the determinations of the sulphur index.

The nature of the chemical combinations of potassium in the tissues, W. KOCH and C. C. TODD (*Abs. in Jour. Biol. Chem., 9 (1911), No. 2, pp. XV, XVI; Proc. Amer. Soc. Biol. Chem., 2 (1910), No. 1, pp. 9, 10*).—According to the authors, the results so far obtained indicate that "sodium and potassium phosphatid compounds exist in all the tissues of the body and are probably of much more importance than the hitherto assumed ion protein combination."

The elimination of caffein in the bile, W. SALANT and W. O. EMERY (*Proc. Soc. Expt. Biol. and Med., 7 (1910), No. 5, p. 155*).—"The elimination of caffein and its products of decomposition in the urine has been studied by a number of investigators in dogs, rabbits, and in man. Its presence in the digestive secretions has been recently made the subject of a special investigation in the pharmacological laboratory of the Bureau of Chemistry of [the Department of Agriculture]. It was found in the bile removed from the gall bladder of a number of dogs poisoned with caffein. In every case appreciable quantities were found. A dog which was given 1.5 gm. of caffein by mouth died four hours later. The bile removed from the gall bladder contained 4.4 mg. of caffein. Similar results were obtained in other experiments. Experiments made on rabbits with temporary bile fistula have shown that the elimination of caffein likewise takes place by this path in these animals. Caffein was found in the bile two hours after its subcutaneous injection."

Chemical studies of human sweat, L. W. RIGGS (*Abs. in Jour. Biol. Chem., 9 (1911), No. 2, p. XIX; Proc. Amer. Soc. Biol. Chem., 2 (1910), No. 1, p. 13*).—Forty-five samples were examined from persons in normal health and from nephritics. The total nitrogen, nitrogen as urea plus ammonia, inorganic solids, potassium, and chlorin were determined in the majority of the samples.

ANIMAL PRODUCTION.

On the chemical composition of the seeds of cultivated plants, E. SCHULZE (*Landw. Ver. Stat., 73 (1910), No. 1-3, pp. 35-170*).—Analytical data are reported on the seeds of *Picea excelsa, Pinus silvestris, P. maritima, P. cembra, P. strobus, Abies alba, Larix decidua, Triticum vulgare, Secale cereale, Avena sativa, Fagopyrum esculentum, Zea mays, Lupinus luteus, L. angustifolius, L. albus, L. hirsutus, Pisum sativum, Vicia sativa, V. faba, Phaseolus multiflorus, P. vulgaris, Soja hispida, Onobrychis sativa, Trifolium pratense, Arachys hypogæa, Fagus silvatica, Juglans regia, Corylus avellana, Castanea sativa, Æsculus hippocastanum, Coffea arabica, Amygdalus communis, Cucurbita pepo, Ricinus communis, Helianthus annuus, Cucumis melo, Sinapis alba, Brassica napus, Spergula arvensis, Ruscus aculeatus,* and *Cannabis sativa.*

Results of the examination of stock feeds, B. L. PURCELL (*Dept. Agr. and Immigr. Va., Dairy and Food Div. Bul. 14, 1910, pp. 118-152*).—Analyses are reported of wheat bran and middlings, ship stuff, red dog flour, rye middlings, corn chop, cottonseed meal, corn bran, hominy feed, oil meal, gluten feed, malt sprouts, rice hulls, barley chaff, flax bran, peanut meal, and mixed feeds.

Report of the activities of the Pommritz Agricultural-Chemical Experiment Station, 1910, LOGES (*Ber. Agr. Chem. Vers. Stat. Pommritz, 1910, pp. 10*).—Analyses are reported of rye bran, barley bran, maize products, rice meal, distillery slop, millet bran, brewers' grains, malt sprouts, corn germ meal, meat meal, and the following cakes: Linseed, turnip, peanut, coconut, sunflower, palm nut, sesame oil, hemp, and soy bean.

Fish guano and its use as feed, R. P. SKINNER (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 103, p. 512*).—Notes on the use, extent, and value of fish meals as feed for live stock are presented.

Report of animal husbandry, H. H. SIMPSON (*New Mexico Sta. Rpt. 1910, pp. 32-36*).—In a feeding test with steers the gains per head and day were as follows: On alfalfa 1.84 pounds at a cost of 3.92 cents per pound; on alfalfa and corn stover 1.17 pounds at a cost of 4.01 cents per pound; on alfalfa and corn meal 2.58 pounds at a cost of 7.33 cents per pound; and on alfalfa 60 days with corn as a supplement the last 30 days 2.06 pounds at a cost of 5.55 cents per pound.

Dairy cows kept on pasture and fed 6 pounds of grain per head and day, produced more milk than cows on the same pasture not fed grain, but the grain increased the cost per quart of milk by 0.82 cent.

Thirty-two pigs on alfalfa pasture made average daily gains per head as follows: Without supplement 0.254 pound, with 8 pounds of grain per day 0.657 pound, with 16 pounds of grain per day 0.73 pound, and with 64 pounds of skim milk per day 0.597 pound. The largest returns per acre for pasture were on the lots which were fed grain as a supplement.

Some methods of incubation of eggs were studied, with the following results: "It was found that by sprinkling the eggs during the last 3 days one-third more eggs were hatched, and the eggs that were sprinkled from the third day on gave about 10 per cent better hatch. Submerging the eggs did not seem to increase the hatch as much as sprinkling.

"While it is comparatively easy to develop the chicks in the large, thick-shelled, dark, Brahma eggs, it is very difficult to get a good hatch. From examination it was found that about 70 per cent of the large, heavy eggs that failed to hatch contained fully developed chicks."

Bullock feeding experiment, G. B. PINYON and B. N. WALE (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 21-25*).—Molascuit gave better results in a steer-feeding experiment than in a similar experiment the preceding year

(E. S. R., 23, p. 475), but heavy feeding with cottonseed and linseed cakes gave better results than either roots or molascuit. The results of two years' work indicate that molascuit may advantageously be used in place of roots for fattening bullocks in the proportion of 1 pound of molascuit to 14 pounds of roots, where molascuit is quoted at £5 per ton and roots valued on the farm at £7 6d. per ton.

There appeared to be but little difference in gains between the animals tied in stalls and those running loose in a covered yard.

Resorption of fat, P. F. Trowbridge (*Science, n. ser., 33 (1911), No. 844, pp. 342, 343*).—An abstract of a paper read before the American Association for the Advancement of Science, December, 1910.

"Seven calves six months old were fed for several months until in a well-fattened condition. One, thought to be the least fat, was slaughtered and analyzed as a check animal. The remaining animals were given the same kind of feed but varied in quantity. Two were held at a maintenance ration, two were so fed as to lose one-half pound per day, and the other two so as to gain one-half pound per day. At the end of 6 months one of each group was slaughtered and analyzed. The remaining submaintenance animal was slaughtered at the end of 11 months, and the remaining maintenance animal at the end of 12 months. The supermaintenance animal was not slaughtered, as the one-half pound per day gain at his age (2 years) was sufficient to make him improve in condition.

"All the maintenance and submaintenance animals lost in fat. The long-maintenance animal gained in total protein and also in flesh protein. All the animals gained in weight of skeleton from 9.5 to 16.6 per cent. The skeleton of all animals gained in protein, moisture, and ash, and in fat except in that of the long-submaintenance animal, which lost over 75 per cent of its original fat. The animal on long submaintenance (11 months) became greatly emaciated and the analysis showed that he had used up nearly all of his reserve store of fat, not only from his flesh, but from his skeleton. The short-submaintenance animal (6 months) and the long-maintenance animal (12 months) had used up nearly all the reserve fat of the tissues, but had not drawn upon the supply in the skeleton.

"The loss in moisture is not sufficient to correspond to the loss in protein for a lean meat or connective tissue, which supports the view that in certain stages, at least, of fat resorption the fat is in whole or in part replaced by water.

"The normal skeleton contains about 36 per cent moisture. In the long-submaintenance animal it has risen to 53 per cent, while the fat content of the skeleton has dropped from 16 per cent to 3 per cent. In this time the skeleton has gained nearly 1 per cent of its total weight in dry protein. The long-submaintenance animal lost 10,627 gm. in dry protein, but only 24,868 gm. in moisture, which lacks about 16,000 gm. of being enough to make up the protein loss to lean flesh and connective tissue. During this time the loss in fat was 43,820 gm., or about 90 per cent of the total fat present at the beginning."

Cattle raising in Chiriqui, F. Lindsay (*Bul. Pan Amer. Union, 32 (1911), No. 4, pp. 643–651, figs. 3*).—An account of the opportunities offered by certain districts of Panama for cattle raising on the public lands.

Breeding from ewes at an early age, B. N. Wale (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 28–31*).—A first report of an experiment to ascertain to what extent breeding at 7 months instead of 1 year 7 months would reduce the size, vigor, and constitution of the ewes. For this purpose 50 crossbred Border Leicester and Cheviots were used. Half of the number were mated at 7 months. When producing and rearing a lamb, each ewe was dwarfed to the extent of 17 pounds as compared with the unmated ewes.

Comparative phosphatic manuring of swedes (*Field Expts. Harper-Adams Agr. Col., and Staffordshire and Shropshire, Rpt. 1910, pp. 24–26*).—In a comparison of basic slag and superphosphate as manures for swedes in respect to the feeding value of the roots, the value of the net gain in weight of sheep in 1910 in favor of the superphosphate was at the rate of 12 shillings 4 pence per half-acre plat.

Protein as a factor in the nutrition of animals.—I, A study of the physical constants of fats from swine, A. D. EMMETT and E. C. CARROLL (*Jour. Biol. Chem., 9 (1911), No. 2, pp. XXIII–XXV*).—An abstract of a paper read at the 1910 meeting of the American Society of Biological Chemists.

Berkshire pigs, of known ancestry and age, were fed different amounts of blood meal in connection with a basal ration of ground corn and crude calcium phosphate. Lot 1 was fed on a low protein plane, lot 2 on a medium or balanced plane, and lot 3 on a high plane. Chemical constants of the leaf, back, intestinal, and jowl fats were determined.

From this preliminary study of the influence of feed the following conclusions are drawn: "If the ancestry, age, and type of the animals are not considered in comparing the data, the different amounts of protein feed have no apparent influence on the physical constants of the fats. The individual idiosyncrasies of the animals may be as great a factor or greater than that of feed. If litter mates be compared, of which there was one in lot 1 comparable with one in lot 2, and one in lot 2 comparable with one in lot 3, these data show that the differences in the physical constants due to feed were very slight. Here, however, the matter of individuality again may be the controlling factor.

"If the data from the various samples be compared with respect to the kind of fats, they show that the values for the iodin number and melting point are quite different in the case of the back fat when compared with the leaf and composite samples of fat. The averages for the iodin number are 51.23 for the back fat, 45.6 for the leaf fat, and 45.91 for the composite fat. The averages of the melting point determinations for the back, leaf, and composite samples of fat are respectively: 34.1°, 42.8°, and 45.7° C. Comparing all samples of fat in respect to both the protein feed and the kind of fat and without regard to ancestry, age, and type of the animal, or to individuality, the specific gravity, saponification number, the insoluble acids, and the index of refraction appear to be practically constant in each case, averaging for all the samples, 0.8934, 196.94, 95.58, and 1.4595, respectively."

Pork production with forage crops, F. B. MUMFORD and C. A. WILLSON (*Missouri Sta. Bul. 95, pp. 561–597*).—This bulletin reports the results of 3 years' feeding experiments in studying the adaptability of forage crops for swine, determining the proceeds per acre for pasturing off forage and grain crops, and working out forage crop rotations suitable for hog farms.

The aim was to take a hog weighing about 70 pounds June 1 and by feeding corn produce a gain of 80 pounds by September 1 regardless of the condition of the forage. The hogs, from 8 to 16 per acre, were mostly grades and crosses with Poland China predominating, of early spring farrow, weighing at the beginning of the tests about 50 to 70 pounds each, and in good growing condition. Corn was valued at 60 cents per bushel, oil meal $30 per ton, and gains produced at 6 cents per pound. To determine the amount of pork produced per acre by forage 10 pounds of gain were accredited to each bushel of corn fed and the remaining gains accredited to the forage.

The average amounts of pork accredited to an acre of forage and the net profits were as follows: For blue grass 285.2 pounds, $17.12; alfalfa 596.8 pounds, $35.71; clover 572.2 pounds, $34.11; rape, oats, and clover 394 pounds, $23.64; sorghum 370.5 pounds, $10.15; cowpeas 224.9 pounds, $13.16; and soy beans 183.1 pounds, $10.99, respectively The results with soy beans are from the 1910 test only, the 1909 results being discarded on account of poor stand. In hogging off experiments with rye the average amount of pork produced per acre was 244.4 pounds at a net profit of $14.66 per acre, and the corresponding amounts for corn were 395.2 pounds and $23.71.

Among other conclusions drawn are the following: Blue grass made more profitable gains in May and June than later. Red clover ranked among the first as a hog forage because of the palatability of the feed throughout the season, and also because of its adaptability to rotations. Rape fitted in well in hog forage crop rotation, if clover was sown with it for the following year. First growth sorghum was adaptable for hogs, and furnished excellent feed through July and August, when other forages were affected by dry weather. Gains made on forage were made at 20 to 30 per cent less cost than gains produced with grain and dry lot feeding. Where forage and grain crops were fed on the land which produced them the minimum amount of fertility was removed, and the physical condition of the soil improved.

[Forage crops for pigs] (*Oreg. Agr. Col. Bul., 1. ser., 1911, No. 48, pp. 68–70, figs. 2*).—In tests made at the Eastern Oregon substation, hogs when feeding on field peas in the field made an average daily gain per head of 1.52 pounds, and produced 256.5 pounds of pork per acre, while the corresponding figures with field peas and hull-less barley were 1.12 pounds per head and day and 190 pounds per acre. The peas were more palatable than the barley, the latter not being eaten until the available peas were gone.

Pig feeding experiments, J. L. Duncan (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 2, pp. 303–310*).—This is a continuation of previous work (E. S. R., 21, p. 473).

The gains with 4 lots of 8 pigs each were as follows: On a meal mixture of maize, barley, and pollard, plus potatoes and separated milk the average daily gain was 1.7 pounds, with a total profit on the lot of £6 6s. 3d.; on the meal mixture and separated milk 1.7 pounds, with a profit of £7 13s. 4d.; on the meal mixture and potatoes 1.23 pounds, at a profit of £3 1s. 3d.; and on the meal mixture plus coconut meal, potatoes, and separated milk 1.5 pounds, at a profit of £4 10s. 7d.

On the 5 separate experiments conducted during the last 4 years, wherever there was a slight advantage it was in favor of the lot that was fed the meal and milk only. The coconut meal did not appear to warrant the extra price paid for it.

Pig feeding experiments, B. N. Wale (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 26, 27*).—Foreign barley gave better returns than English barley for pork production, on the average 0.25 pound less of the foreign barley being required for each 1 pound gain in live weight. Coal slack proved a valuable supplement to the grain ration when fed in small amounts.

Feeding experiments with invert potato flakes, Klein (*Milchw. Zentbl., 7 (1911), No. 2, pp. 70–74*).—As in a previous experiment (E. S. R., 23 p. 476) there was found to be no advantage in inverting potatoes flakes with diastasolin for feeding to pigs.

A note on the feeding value of coconut and peanut meals for horses, G. M. Rommel and W. F. Hammond (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 168, pp. 2*).—In a test with Morgan yearlings and heavy work horses, lasting about four months, in which coconut meal and peanut meal in the proportion of 2:1 were substituted for one-half or the entire oat ration, the yearlings showed somewhat larger and cheaper gains on the coconut and peanut meal, those having all their oats replaced giving the best returns. The results were fairly satisfactory with the work horses, there being a little saving in cost of feed.

"This test seems to indicate that at the prices paid for feed at the time coconut and peanut meal, in the proportion of 2 pounds to 1, can replace oats in the ration of young horses and may be found advantageous for work horses after they have become accustomed to it."

Sawdust cakes for horses (*Rev. Eaux et Forêts, 49 (1910), No. 19, p. 603; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 103*).—An account of a stock food which is made by fermenting sawdust, treating it with several chemical processes, and mixing it with rye flour in the proportions of 2 parts of sawdust to 1 part of flour. It is then baked in the same way as bread and used for feeding horses.

Report of poultryman, J. S. JEFFREY (*North Carolina Sta. Rpt. 1909, pp. 23–25*).—In the summer of 1908, cottonseed meal was fed for three months to fowls in quantities ranging from 10 to 20 per cent of the total ration. No bad effects were noted. A continuation of the work is now in progress; but among the results already obtained are the follwing: "Fowls do not relish cottonseed meal as well as meat meal, and therefore do not eat freely of mash containing cottonseed meal. Pullets fed on a cottonseed-meal ration do not develop as rapidly or start to lay as soon as those fed on a ration containing meat meal. Hens have done better than pullets on rations containing cottonseed meal. The addition of bone meal to a meat-meal ration reduced the cost of egg production and increased the size of stock. The addition of bone meal to cottonseed-meal ration did not reduce the cost of production, due probably to the small amount of cottonseed-meal mash eaten."

"The work . . . in testing the value of supplying moisture to the incubator and in disinfecting each incubator just before putting in eggs has been continued. Disinfecting the eggs with a 10 per cent solution of zenoleum has also been tried. This solution was found to be too strong, as it injured the hatching quality of the eggs. The use of a sand tray in the bottom of the incubator to supply moisture has given good results, the percentage of chicks which died in the shell being materially reduced. . . . By the use of hygrometers we found that the use of the sand tray raised the relative humidity an average about 10 per cent above that of similar machines in the same room without the sand tray."

Production and trade in Peruvian hides (*Bol. Uffic. Assoc. Indus. e Com. Cuoio [Turin], 1910, p. 760; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 132*).—An account is given of this important industry. The goat and kid hides are highly valued for suppleness and strength and the ease with which they can be tanned. The hides from the arid districts of the Sierra are sun dried and exported. Nearly all of the kid skins from Piura are sent to the United States.

Nutrition and evolution, H. REINHEIMER (*London, 1909, pp. XIII+284, fig. 1*).—In this book some fundamental laws of nutrition and other biological problems are discussed.

Nucleus and cytoplasm in heredity, M. F. GUYER (*Amer. Nat., 45 (1911), No. 533, pp. 284–305*).—The author points out that in the protein molecule there is an ample basis for the handing on of metabolic energies termed "heredity," as discussed by Reichert and Brown (E. S. R., 22, p. 701).

"The mechanism of heredity would seem to be not so much a local problem of nucleus or cytoplasm as of (1) fundamental species substances, probably mainly protein in nature, together with (2) equally specific enzymic substances which regulate the sequences of the various chemical and physical processes incident to development. As development progresses, more and more kinds of chemical products are released and in consequence an increasing number of chemical reactions are set going. . . . Looked at this way, the physical basis of heredity could not be considered a series of equipotent units, but rather it must be regarded as being composed of systems of units of different orders of organization and different degrees of coordination."

It is stated that there is no warrant for assuming that chromosomes are more important than other constituents of the nucleus, though they may have many other functions—among them the important one of supplying a particular amount of enzyms—and that the process of mitosis provides for consistency of equilibrium instead of consistency in the number of chromosomes.

On a new method of determining correlation, when one variable is given by alternative and the other by multiple categories, K. PEARSON (*Biometrika, 7 (1910), No. 3, pp. 248–257*).—The object of the present paper is to carry the idea involved in double-row correlation tables (E. S. R., 22, p. 671) a stage further by supposing the variable classified into multiple categories to be purely qualitative. The theory of the method is given, accompanied by illustrations to show its adaptability to a wide range of problems.

The determination of sex, J. A. THOMSON (*Jour. Roy. Micros. Soc. [London], 1911, No. 2, pp. 141–159*).—An address by the president of the Royal Microscopical Society, January, 1911, in which recent work on this subject is reviewed. The following conclusion is subjoined: "There may be no sex determinant at all in the usual sense, but what determines sex is a metabolism rhythm, or a relation of nucleoplasm and cytoplasm, or a relation between anabolism and katabolism."

DAIRY FARMING—DAIRYING.

An effect of succulent and nonsucculent fodders upon quality and quantity of milk produced by milch cows, A. MIYAWAKI (*Hoard's Dairyman, 42 (1911), No. 17, pp. 572, 573*).—The decline in milk flow was 7.86 per cent when the change of the rations was from corn fodder to corn silage, and 14.19 per cent when the change was made from silage to fodder. The corresponding declines in yield of butter fat were 10.16 and 18.18 per cent.

There was but little change in the percentage of solids-not-fat, the specific gravity, or the acidity when either change was made in the feed, but the slight difference was always in favor of the succulent ration. The sugar content decreased faster when the nonsucculent ration was changed to the succulent ration than when the reverse change was made. Cows receiving a nonsucculent ration consumed 14.01 per cent more total dry matter for a production of a unit amount of milk, 17.77 per cent more for butter fat production, and 17.24 per cent more for solids-not-fat production than when receiving a succulent ration. The cows maintained their weight when on the succulent ration, but lost an average of 0.23 pound per day on the dry ration.

Cost of winter feeding in milk production, DUNSTAN (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 141–147*).—A study of the cost of milk production on a number of farms.

"An examination of the figures from 60 farms and 2,038 cows shows that where an average quantity, 20.3 pounds, of hay was used on 22 farms and 519 cows, the daily cost of the cows' ration was 17.4 pence, and the cost of production of a gallon of milk 7.77 pence; whereas on 30 farms (1,324 cows), where the average quantity of hay was 7.8 pounds, these figures were 13 pence and 6.16 pence, respectively, a reduction of 25 per cent and 22.3 per cent, respectively. It is probable that the dairy farmer would get equally satisfactory milk yields at a reduction of cost if less long hay were fed, and if the bulky fodder consisted of sound straw and chop with a foddering once a day of long hay."

"It would seem undesirable from an economic point of view to feed a greater quantity than 60 to 70 pounds of roots per cow per day."

Influence of temperature on milk yield.—Ventilation of cow byres, C. DOUGLAS (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 170–189*).—A continuation of earlier work (E. S. R., 21, p. 376). In these experiments 104 pure and crossbred Ayreshires at five different places were used. The percentage of carbonic acid in freely ventilated stables and in those where the ventilation was restricted and the yields of milk are presented in tabular form. The following conclusions are drawn:

"Any restriction of ventilation sufficient to bring the temperature of a byre up to 60° F. leads to a degree of atmospheric impurity inconsistent with the conditions of perfect health. In byres in which the temperatures have been kept down by thorough ventilation in autumn, cows do not suffer either in health or milk yield even from very low temperatures in winter. Whatever waste of food may be entailed in the maintenance of the body heat of cows in colder byres is more than counteracted by the influence of fresher air; while it is evident that the health of animals is much more likely to be promoted by active digestion than by the mere prevention of loss of body heat. It should also be observed that the colder temperature in autumn causes the cows to grow and to retain thick coats of winter hair; so that it is not even certain that the body heat is better conserved in the less ventilated byres than in those which permit the animals to retain their natural coverings. . . .

"A careful attempt should be made to give such a degree and kind of ventilation as will, without creating draughts, keep the temperature of the byre always down to 50°. Special care should be exercised to keep the temperature of the byre well below this point in autumn and early winter."

Variation in the composition of cow's milk with advance of lactation, C. CROWTHER and A. G. RUSTON (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp 93–102, fig. 1*).—The article contains data on the variation in the percentages of fat, ash, protein, and sugar during the lactation period.

"Tests have brought out very clearly the fact that the variations in the composition of milk with advance of lactation may differ greatly in the case of different cows, so that no precise generalizations upon the subject can be formulated. In general the milk is richest in total solids, fat, and albuminoids in the earliest and latest stages of lactation, and poorest about the second or third month. The sugar content tends to decrease steadily with advance of lactation after the first month or so, but the proportion of ash remains approximately constant."

In colostrum the proportion of total solids in milk fell rapidly, the loss being mainly in albumin.

Dairying and milk in Louisiana (*Quart. Bul. La. Bd. Health, 2 (1911), No. 2, pp. 36, figs. 12*).—This bulletin contains a number of articles on dairy husbandry, the production of sanitary milk in Louisiana, the use of milk as food, and the health train campaign for clean milk, and reports analyses and bacterial counts of milk.

Equipment and sales on a German dairy farm, H. J. DUNLAP (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 111, pp. 649–651*).—Descriptions of equipment and methods of management of a German farm, including methods of utilizing the crops grown, the character of the cattle kept, the management of milk, the value of the milk, and the price of labor are presented.

Milk tests (*Field Expts. Harper-Adams Agr. Col., and Staffordshire and Shropshire, Rpt. 1910, pp. 53, 54*).—Milk records of the college herd and analyses of the milk are reported. The average yield of green cheese per gallon of milk for the year was 1.26 lbs., being lowest in June and highest in February.

Milk records, C. Douglas (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 222–232*).—This is the eighth report of the Scottish Milk Record Committee, in which the records of 9,514 cows are discussed.

Work of the Kiel Experiment Station for dairy products, edited by H. Weigmann (*Arb. Vers. Stat. Molkw. Kiel, 1909, Nos. 6, pp. 109; 7, pp. 132, pls. 9*).—This contains two articles on dairy bacteriology which have been noted from other sources, and also the following articles, which consist mainly of descriptions of the characteristics of new species of bacteria found in milk: Concerning Armenian matzoon, by H. Weigmann, T. Gruber and H. Huss; On the yellow-brown color of hard cheese, produced by *Microccoccus chromoflavus*, by H. Huss; Morphological-physiological studies on two aroma-forming bacteria, *Bacillus esterificans* and *Pseudomonas trifolii*, n. sp., by H. Huss; A contribution to the knowledge of bacteria producing the aroma of strawberries; Description of *P. fragaroidea*, n. sp., by H. Huss; On the characteristics of a new species of bacteria isolated from canned milk (*Plectridium novum*), by H. Huss; and Fat-splitting bacteria (*Bactridium lypoliticum*, n. sp.) by H. Huss.

Does colostrum possess bactericidal properties? M. Bub (*Besitzt die Kolostralmilch bakterizide Eigenschaften? Inaug. Diss., Giessen, 1910; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 21, p. 826*).—The data have been noted from another source (E. S. R., 24, p. 77).

[A dairy score card], H. H. Lyon (*Hoard's Dairyman, 42 (1911), No. 17, p. 569*).—This is a card for scoring dairy barns and milk houses which is used by a large condensed milk firm of New York.

Score card system of dairy inspection, G. M. Whitaker (*Hoard's Dairyman, 42 (1911), No. 24, p. 761*).—A criticism of the score card, noted above.

The scientific dilution of milk, L. Wainwright (*Med. Mag., 20 (1911), No. 3, pp. 158–162*).—The difference between cow's and human milk is discussed, and a method is described for modifying cow's milk when used for feeding infants.

Factors affecting the per cent of fat in cream from farm separators, C. H. Eckles and H. S. Wayman (*Missouri Sta. Bul. 94, pp. 517–558, figs. 12*).—This bulletin reports a series of experiments which were conducted to ascertain the causes of wide variations in the percentage of fat in cream from hand separators. The conditions covered by the investigations were those which were thought certain to vary on every farm, namely, (1) speed of separator, (2) temperature of milk separated, (3) rate of inflow to separator bowl, (4) richness of milk separated, and (5) acidity. It was assumed that the percentage of fat in cream is influenced by the amount of water or skim milk used to flush out the bowl at the end of the run and by the adjustment of the cream screw. Five different makes of hand power, centrifugal cream separators were used.

In a preliminary test with water 80 per cent more water was delivered from the skim milk tube when the separator was being fed its full capacity than under the ordinary rate of inflow, showing that the skim milk tube does not commonly run to its full capacity.

The usual explanation that by turning the cream screw nearer the center richer cream is obtained because the richer cream found near the center is held not to be the full explanation. It is pointed out that turning the cream screw nearer the center causes an increased outflow from the skim milk tube and a relatively smaller amount of and richer cream.

In testing the effect of speed of separators each machine was tested at the speed recommended by the manufacturers, and at three-fourths and one-half this speed. It was found that with one exception, set for thin cream, the greater the speed of the machine the higher the percentage of fat in the cream, and this effect was much more marked when the cream screw was set for thick cream. Within ordinary limits the greater the speed the less the amount of fat remaining in the skim milk. This did not vary to any marked extent whether the separator was set for thin or thick cream. The rate of inflow was uniformly increased by the speed. The explanation given for this is not that the greater the speed of the separator the more milk will run through it in a given time, but that it is due to suction caused by the flow of air through the machine. The capacity of the separators did not vary to any extent whether set for thick or thin cream.

In ascertaining the effect of the temperature of the milk tests were made at 70°, 80°, and 90° F., respectively. Contrary to the general assumption, the results indicate that the higher the temperature of the milk separated the thinner the cream. This was found to be more marked when the separator was set for thick cream than for thin cream. The results show that the colder the milk separated the greater was the percentage of fat in the skim milk. The capacity of the machines did not vary materially with milk of high or low temperature.

In testing for the effect of the richness of the milk separated, one lot was separated under normal conditions, and the skim milk obtained was used in reducing the second lot to about 3 per cent fat. The only marked variation was the percentage of fat in the cream, which was found to vary practically in direct proportion to the percentage of fat in the milk separated. Within ordinary limits the richness of the milk had no appreciable effect upon the loss of fat in the skim milk or upon the capacity of the machine.

In the experiments on the effect of the rate of inflow, three runs were made with each lot of milk: First, with the feed can full of milk; second, half full; and third, with the milk 1 inch from the bottom. The rate of inflow was changed in other trials by the faucet. In general a decrease in the inflow resulted in (1) less cream in proportion to skim milk, (2) higher percentage of fat in the cream, (3) no appreciable effect as to the loss of fat in the skim milk.

Acidity had but little effect except that with sour milk there was a tendency for the percentage of fat in the cream to be increased, especially when the cream screw was set for thick cream.

The effect of dirt in the tubes and of clogging of the bowl is also discussed.

Milk powder starters in creameries, C. LARSEN and W. WHITE (*South Dakota Sta. Bul. 123, pp. 3–14*).—In a preliminary investigation on the use of milk powder solutions in the place of natural milk for starter making it was found that the best degree of concentration to supply conditions for bacterial growth was in the proportion of 3 ounces of powder to 1 quart of water. The comparative development of acidity and bacteria in mother starters, prepared from both milk powder and natural skim milk, is presented in tabular form. The growth of both bacteria and the development of acid and flavor was normal. Stained preparations of the bacteria from milk powder solutions appeared the same under the microscope as those grown in natural milk.

A comparison of the specific gravities, amount of acid developed, and number of bacteria per cubic centimeter showed that the solution of 3 ounces of powder in 1 quart of water furnishes the bacteria conditions resembling very closely those formed in natural milk. Butter made from the milk powder starters scored equally as high as when made of natural milk starters, both when fresh and when 2, 4, and 6 weeks old. The scorched flavor in the milk powder was not detected in any of the samples of butter made. The cost of the powder starters is somewhat higher than that from those made of milk, it being estimated at 0.3 to 1 cent per pound of butter made, yet they are recommended for large central plants in cities where an ample supply of good milk can not be obtained at the usual price.

The method of making the milk powder starters is described.

Propagation of starter for butter making and cheese making, E. S. Guthrie (*New York Cornell Sta. Circ. 10, pp. 13–16*).—This contains directions for propagating starters for butter and cheese making.

On the composition of uninspected Holland butter in the Province of North Brabant in the years 1905–1910, H. Sprinkmeyer (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 7, pp. 411–416*).—Results of the Reichert-Meissl test are presented in tabular form and show that since the butter has been inspected the adulteration with foreign fats has been greatly reduced.

Development of cooperative dairying in Russia, A. A. Kalantar (*Ezheg. Dept. Zeml. [Russia], 30 (1909), pp. 555–573*).—The first cooperative dairying in Russia was in making cheese in the late sixties. Though many persistent attempts were made by the peasants to follow the methods of the Swiss cheese makers, they ended in failure because of the long time required for ripening and the slow monetary returns. The first cooperative creameries were started in the Tobolsk Government in 1896 and have been so successful that in 1909 there were in Siberia 1,400 cooperative butter-making factories, most of which were in the Tobolsk and Tomsk Governments. Cooperative butter making has been less successful in European Russia because of the poverty of the peasants who need a quick return in cash for their products, but outside aid has been recently brought to their assistance and the number of cooperative factories has been increasing.

Skim-milk cheese, E. H. Hess (*Penn. Dept. Agr. Bul. 200, pp. 15, pls. 10*).—This bulletin describes methods of making cottage, Dutch, pot, and egg cheeses from skim milk.

VETERINARY MEDICINE.

The construction, equipment, and management of veterinary quarantine and epizootic stables for cavalry troops, with investigations in regard to damp foundations, their detection, and remedy, F. Ehrle (*Über Bau, Einrichtung und Betrieb von Veterinärlazaretten, Seuchen- und Quarantäneställen bei den berittenen Truppen mit Untersuchungen über die Mauerfeuchtigkeit, ihre Feststellung und Abhilfe. Inaug. Diss., Univ. Bern, 1910, pp. 164, pls. 6, tables 2*).—This work deals chiefly with military stable hygiene, and has particular reference to the construction of stalls for quarantining against such diseases as erysipelas and pneumonia. It lays special stress upon the methods for detecting damp foundations and the removal of the cause therefor.

In regard to increasing the disinfecting value of phenols by the addition of acids, E. Hailer (*Arb. K. Gsndhtsamt., 33 (1910), No. 3, pp. 500–515*).—The disinfecting value of phenols and the three cresols can be increased by the addition of such acids as oxalic, sulphuric, acetic, citric, tartaric, and boric, and as regards potency in the order stated. Where no phenols were employed, sulphuric acid was found to be a better disinfectant than oxalic, while tartaric, citric, and acetic acids were about equally effective.

The toxicity of amyl acetate, W. Salant (*Proc. Soc. Expt. Biol. and Med., 7 (1910), No. 5, pp. 154, 155*).—In the pharmacological laboratory of the Bureau of Chemistry of this Department it was determined that "from 4 to 6 cc. per kilogram of amyl acetate injected into frogs caused paralysis and coma in from 15 to 30 minutes. These symptoms lasted 24 hours, with final recovery. In some cases such doses proved fatal. Larger doses were invariably fatal. Experiments with 2.5 cc. per kilogram administered in 2 per cent suspension in water, failed to cause any symptoms.

"Experiments were also made on rabbits. Amyl acetate was given by mouth in aqueous suspension or dissolved in neutral olive oil. Five cc. of amyl acetate given by mouth to rabbits weighing about 1,500 gm. did not produce any symptoms in any of the animals experimented upon, except one in which the dose proved fatal within 24 hours after its administration.

"The effect of amyl acetate on blood pressure was studied in dogs. One cc. injected directly into the circulation within 25 seconds caused a fall of blood pressure amounting to 56 per cent. When the vagi were eliminated the fall of blood pressure was still greater. In both instances there was a marked slowing of the pulse."

Notes on Crotalaria burkeana and other leguminous plants causing disease in stock, J. BURTT-DAVY (*So. African Jour. Sci., 7 (1911), No. 6, pp. 269–277*).—In addition to an account of *C. burkeana*, a native plant of the Transvaal and the disease which it causes, known to farmers as "styfziekte," brief mention is made of several other plants causing neuritic troubles.

Report on the operations of the veterinary sanitary service of Paris and the Department of the Seine for the year 1909, H. MARTEL (*Rap. Opér. Serv. Vét. Sanit. Paris et Dépt. Seine, 1909, pp. 330, figs. 17*).—Part 1 of this volume reports on the occurrence of contagious diseases (pp. 1–77); part 2 on meat inspection (pp. 78–236); part 3 on the inspection of milk (pp. 237–250); part 4 on the inspection of several classes of establishments, including abattoirs, etc. (pp. 251–254); and part 5 on work of the laboratories (pp. 255–322). Statistical data, etc., are given on rabies, tuberculosis, glanders and farcy, hog cholera, and charbon.

Report of the chief veterinary surgeon, J. M. SINCLAIR (*South. Rhodesia Rpt. Dir. Agr., 1909, pp. 25–31*).—The author here reports on the occurrence of stock diseases during the calendar year 1909.

Tropical diseases of animals (*Trans. IX. Internat. Vet. Cong. The Hague, 4 (1909), pp. 212–244*).—This report includes papers by Dschunkowsky on the protozoan diseases of animals in Transcaucasia; by S. Luhs on the piroplasmosis of the hedgehog, due to *Piroplasma erinacei*, that occurs in the vicinity of the Surnabad rinderpest-serum station, and brief mention of piroplasmosis in the fox due to *P. vulpis;* and by Tartakowsky on the etiology and pathology of spirochetosis of geese and on piroplasmosis of the bat *Vespertilio noctula* and the agent that transmits it (thought to be *Argas vespertilionis*). See also a previous note (E. S. R., 22, p. 386).

The relation between hypersensitiveness and immunity, E. FRIEDBERGER (*Berlin. Klin. Wchnschr., 47 (1910), No. 32, pp. 1490–1492; Deut. Med. Wchnschr., 37 (1911), No. 11, pp. 481–487, dgms. 5; abs. in Ztschr. Immunitatsf. u. Expt. Ther., II, Ref., 3 (1910), No. 11, pp. 979, 980*).—According to this work, immunity and anaphylaxis are not antagonistic to one another, the only difference being in the end effects. This is due to the different properties of the antigens in question and the different quantitative relations.

The problem of protein anaphylaxis, H. PFEIFFER (*Das Problem der Eiweissanaphylaxie. Jena, 1910, pp. 231, dgms. 7*).—This work, which has particular reference to the problems of anaphylaxis for forensic purposes, contains the following chapters: Historical review; sensitization and the preanaphylactic phenomena; reinjection; active anaphylaxis; antianaphylaxis; passive anaphylaxis and the method for measuring the anaphylactic immune bodies; test tube experiments; the significance of anaphylaxis for the practical differentiation of proteins; and some practical examples in anaphylaxis. A bibliography is appended.

The parenteral introduction of proteins, V. C. VAUGHAN, J. G. CUMMING, and C. B. MCGLUMPHY (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 9 (1911), No.*

1, pp. 16–28).—Egg white was introduced into animals and the blood and tissue extracts from them tested for its presence by sensitizing guinea pigs.

The work shows that egg white injected into the stomach, rectum, or peritoneal cavity of a rabbit may be, in part at least, absorbed unchanged. Egg white injected intravenously in rabbits quickly disappears from the circulating blood, but may subsequently be detected in the peritoneal cavity, and by the sensitization test in certain organs. It may also be detected in the bile. When carried into the tissue after intravenous injection it may be washed back into the blood current by transfusion with salt solution. The injection of egg white intravenously in rabbits decreases after a few hours the total protein in the blood, but injection in large amount proves fatal.

Biological differentiation of the protein of mice and various species of rats, F. Graetz (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 6* (*1910*), *No. 4, pp. 627–643; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 6* (*1911*), *No. 1, p. 18*).—It is not possible, according to the author, to differentiate the proteins of the various species of rats (*Mus decumanus, M. rattus*, and white rats) with the precipitin and complement-binding or fixation and anaphylaxis reactions. On the other hand, however, it is possible with the complement-binding and precipitation methods to differentiate the protein from the various species of rat from that of the white mouse.

Anaphylaxis with plant substances, T. Azuma (*Beiträge zur pflanzlichen Anaphylaxie. Diss., Osaka, 1910; abs. in Ztschr. Immunitatsf. u. Expt. Ther., II, Ref., 3* (*1910*), *No. 11, p. 996*).—Anaphylaxis is not so easily produced with plant antigens as with animal antigens. The experiments, which were conducted with soy beans, horse beans (*Vicia faba*), rice, and barley, show that anaphylaxis can be produced by giving either one large initial dose of the antigen or repeated small doses.

Precipitating characteristics of plant antigens, T. Azuma (*Beiträge zum Studium der präzipitierenden Eigenschaften pflanzlicher Antigene. Diss., Osaka, 1910; abs. in Ztschr. Immunitatsf. u. Expt. Ther., II, Ref., 3* (*1910*), *No. 11, p. 994*).—Seed and seed-germ extracts from rice, barley, horse beans (*Vicia faba*), and soy beans are capable of producing precipitins. The normal sera of various animal species were found to give a precipitation with these plant extracts. The precipitin-forming substance of the plant extracts is destroyed by autolysis. The precipitinogens are weakened by a temperature of 60° C., and absolutely checked at 80°, but at 100° they are revived.

The action of some lipoid substances upon ultrafilterable viruses, Y. Fukuhara (*Ztschr. Immunitatsf. u. Expt. Ther., I, Orig., 9* (*1911*), *No. 1, pp. 75–86*).—Oleic acid was found to exert a strong destructive action upon all viruses, including chicken pest vaccine virus and the virus of rabies. Sodium and potassium oleate and lecithin, however, did not possess such a capacity, save for the virus of rabies. The bactericidal action of pyocynase, according to the author, is probably due to the presence of an alcohol-soluble lipoid substance which, when isolated, is more powerful than the original pyocynase. Coli lipoids did not have any effect upon the various viruses.

Methemolytic reactions, O. Bail and S. Suzuki (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 9* (*1911*), *No. 1, pp. 42–60*).—A specific prepared solution of sensitized blood corpuscles is still capable of fixing large amounts of hemolytic immune bodies in the same manner as intact sensitized blood corpuscles. From this it appears that the hemolysis which goes on between the blood corpuscles and the serum does not go on to the final reaction, but simply acts as a preparer or an accompanist for the reacting substances contained in the blood corpuscles. This is termed by the author, " methemolysis." The excessive fixation of immune bodies by the blood corpuscles, which are not necessary for the hemolysis, can be explained by methemolysis, which follows the usual hemolysis.

In regard to the method of combination of the hemolytic amboceptors, K. KAWASHIMA (*Biochem. Ztschr., 31 (1911), No. 1–2, pp. 135–141*).—The results show that the amboceptors from the dog and rabbit behave practically alike in their manner of combining with goat's blood.

A simple method for counting the eosinophils, R. DUNGER (*München. Med. Wchnschr., 57 (1910), No. 37, pp. 1942–1944; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 22, p. 854*).—The counting fluid utilized for this consists of 10 cc. of a 0.1 per cent aqueous solution of eosin, 10 cc. of acetone, and 80 cc. of water. The blood is diluted with this fluid in the proportion of 1 : 10, shaken for from three to five minutes, and a portion of it brought into the counting chamber.

Staining the anthrax bacillus, FOTH (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 8, pp. 129–132*).—This is a simplified, accurate, and rapid method, and which utilizes azur II and Nocht's red from methylen blue as the dyestuffs.

The cultivation of the smyptomatic anthrax bacillus with amino acids, J. BIELECKI (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 3, pp. 100–102*).—A feeble development of this bacillus was noted in solutions of asparagin, glycin, glutaminic acid, and leucin. The best results were obtained with asparagin.

Two cases of brain anthrax, A. WEPFER (*Zwei Fälle von Gehirnmilzbrand. Inaug. Diss., Heidelberg, 1910; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 48 (1910), No. 8, p. 225*).—A report of the anatomo-pathological and microscopical findings of two cases.

In regard to differentiating between the enteritidis and paratyphoid B bacteria, R. TROMMSDORFF and L. RAJCHMAN (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 9 (1911), No. 1, pp. 61–74*).—The results show that the agglutination test is an uncertain one for differentiating the enteritidis from the paratyphoid B bacterium.

Nutritional disturbances of the skin in foot-and-mouth disease, S. LÁSZLÓ (*Állatorvosi Lapok, 32 (1909), No. 48, pp. 592, 593; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 8, p. 134*).—Among 1,800 head of cattle in one community, 75 per cent of them became slightly affected with this disease. The fatalities at this period were limited to 4 suckling calves. After three to four weeks the author noted that the hair in about 10 per cent of the infected animals became long, straight, and uneven, and that despite the hot weather the animals did not sweat. Clinically, the condition was characterized by a body temperature of about 40° C., a superficial respiration of 60 per minute, loss of appetite, diminution in lactation, and salivation. A few of these animals succumbed with cachexia.

The chemotaxic action of glanders bacillus extracts, HOBSTETTER (*Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), Sup., pp. 153–160; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 48 (1910), No. 8, pp. 247, 248*).—The toxins were found to act only upon the polymorphonuclear neutrophilic leucocytes.

Pathology and therapy of rabies, O. LENTZ (*Deut. Med. Wchnschr., 36 (1910), No. 27, pp. 1257–1262; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 48 (1910), No. 8, p. 30*).—A short historical and statistical discussion of rabies in man and animals, with particular reference to the incubation time, prognosis, and treatment.

Hepatic distomiasis (sheep rot) in man, G. R. WARD (*Brit. Med. Jour., 1911, No. 2625, pp. 931–935, figs. 2*).—The author finds records of 24 cases of the occurrence of liver fluke (*Fasciola [Distoma] hepatica*) in man, 13 or 14 of which appear to be authentic. The biology of the parasite is discussed, together with an account of the course of the disease as it occurs in man.

On some examinations of blood of the horse, ox, and sheep in Madagascar, J. Mamet and Loiselet (*Rev. Gén. Méd. Vét., 17 (1911), No. 198, pp. 330–335*).—The authors state that in Madagascar piroplasmosis occurs in the horse, ox, and sheep. The bovine form, which is known to the natives as "beravy" or "tazon'omby," is not considered to be of economic importance, as it always occurs in a benign form. Nevertheless the authors think that its diminution of the resistance of cattle to other diseases may explain the great annual loss caused in Madagascar and Bara by tuberculosis and charbon, particularly the acute course run (6 to 12 hours) by charbon in cattle. Equine piroplasmosis is more grave than bovine and may prove fatal. This disease in sheep explains the difficulty encountered in raising them in Madagascar.

The species of tick or ticks that serve as active agents in the transmission of these affections remain to be determined.

On the development of Piroplasma parvum in the organs of cattle suffering from East Coast fever, R. Gonder (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 27, 537–539, figs. 17*).—This account of *Theileria* (*Piroplasma*) *parva* has been previously noted from another source (E. S. R., 24, p. 83).

The development of Theileria parva, the cause of East Coast fever of cattle in Africa, R. Gonder (*Arch. Protistenk., 21 (1910), No. 2, pp. 143–164, pls. 5, fig. 1*).—This is a detailed report of the investigations noted above, with references to the literature, of which a bibliography of 26 titles is appended.

The prevention and eradication of East Coast fever, A. Theiler and J. M. Christy (*Transvaal Dept. Agr., Farmers' Bul. 129, 1910, pp. 15, figs. 7; Transvaal Agr. Jour., 9 (1910), No. 38, pp. 1–3, figs. 7*).—A general consideration of the disease, the ticks which transmit it, and preventive and remedial measures.

Trypanosome diseases of domestic animals in Uganda, IV, V, D. Bruce et al. (*Proc. Roy. Soc. [London], Ser. B. 83 (1911), No. B 563, pp 176–186, pls. 3, figs. 2*).—Continuing previous work (E. S. R., 24, p. 586), the authors find that *Trypanosoma uniforme* resembles *T. vivax* in shape and general appearance but differs markedly in size and that it also resembles *T. vivax* in not being pathogenic in the smaller laboratory animals. There is no evidence available as to what is the carrier of *T. uniforme.*

"*T. nanum* is indistinguishable from *T. pecorum* either in the living condition or when fixed and stained. It differs from *T. pecorum* in not being pathogenic to the smaller laboratory animals. The carrier of *T. nanum* is probably the same as that of *T. pecorum*, as both diseases occur under the same conditions, but there is no evidence available as to what the carrier is."

Experiments to ascertain if antelope may act as a reservoir of the virus of sleeping sickness (Trypanosoma gambiense), D. Bruce et al. (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 564, pp. 311–327*).—While antelope have not been found naturally infected with *T. gambiense*, the authors have discovered that water buck, bush buck, and reed buck can readily be infected with a human strain of this trypanosome through the bites of infected *Glossina palpalis.*

"Antelope of the water buck, bush buck, and reed buck species, when infected with the virus of sleeping sickness, can transmit the infection to clean laboratory-bred *G. palpalis.* This transmission of the infection to clean laboratory-bred flies may occur at least 81 days after the last feed of the infected flies on a buck. *G. palpalis*, when infected with the virus of sleeping sickness obtained from the blood of infected antelope, are capable of transmitting the virus to susceptible animals."

Experiments to ascertain if the domestic fowl of Uganda may act as a reservoir of the virus of sleeping sickness (Trypanosoma gambiense), D. BRUCE ET AL. (*Proc. Roy. Soc. [London], Ser. B, 83 (1911), No. B 564, pp. 328, 329*).—The experiments here reported show that the Uganda fowl can not act as a reservoir for the virus of sleeping sickness.

Notes on a human trypanosome transferable to animals in northern Rhodesia, L. E. W. BEVAN (*Vet. Jour., 67 (1911), No. 427, pp. 41-47*).—A trypanosome which has been definitely identified as *Trypanosoma vivax* was isolated from a European arriving in southern Rhodesia from the northern part of the colony. Laboratory animals, a sheep, and a mule were readily infected through inoculation of the virus.

Auto-agglutination of red blood cells in trypanosomiasis, W. YORKE (*Ann. Trop. Med. and Par., 4 (1911), No. 4, pp. 529-552*).—Auto- and iso-agglutinin are present in the blood of cases of sleeping sickness and of animals infected with trypanosomiasis. Reaction between auto-agglutinin and red blood cells takes place only at low temperatures. Auto-agglutinin can be removed from plasma by absorption with the erythrocytes of the same animal at 0° C. The reaction between auto-agglutinin and red blood cells is reversible. Auto-agglutinin exists in small amounts in the blood of many normal animals. Auto, iso, and hetero agglutinin are frequently present in much greater amount in the blood of infected animals than in that of normal animals, and it is due to this fact that clumping of the red blood cells is often visible in fresh cover-slip preparations of the blood of infected animals. From the red blood cells of an infected animal which have been agglutinated in the cold by the plasma of the same animal an active substance can be extracted with normal saline solution at 37°. This substance agglutinates not only the red cells of the same animal and other members of the same species but also those of many animals of different species.

"It is to be inferred from the information at present available that a marked degree of auto-agglutination of the red blood cells is an extremely rare occurrence apart from an infection with trypanosomes."

The reaction curve of the human and the bovine type of the tubercle bacillus in glycerin bouillon, T. SMITH (*Jour. Med. Research, 23 (1910), No. 2, pp. 185-204, dgms. 5*).—The basic principles involved in this work have been previously noted (E. S. R., 17, p. 294), but in this article the author has gone over his methods again and determined more precisely the conditions which will make uniform results possible. In addition to this, he reviews the results obtained by others with the method. He also tested the correctness of Duval's theory that the acid production by the tubercle bacillus is due to autolytic processes following the death of the bacilli which act upon the glycerin molecule.

The results of these tests indicated that "wherever growth was definitely checked by chloroform or heat and the culture remained free from outside contamination the change in reaction was usually in the direction of a higher acidity. This change was slight, from 0 to 0.8 per cent ad maximum. At the termination of the test, usually from two to three months after the treatment of the culture by heat or otherwise, the bacillar mass was collected and subjected to centrifugal action to determine the amount. The control cultures which were left to finish their growth contained as a rule twice as much bacillar deposit as those heated or chloroformed or exposed to water, salt solution, etc. The amount of acid production in them was, however, five to seven times as great as that which took place after the cultures had been checked."

The author, however, is not inclined to adopt the Duval hypothesis, and still coincides with Siebert in his belief that the second part of the reaction curve is largely associated with the life processes, and that very little is due to the process of disintegration. He believes that were the acid wholly of post-mortem origin its neutralization could hardly be expected to revive a portion of the bacilli to renewed activity.

Some further tests which were made with media containing various amounts of glycerin showed that two processes may occur, one being a rapid fermentation and the other a later disintegration process. The author was able to confirm a previous conclusion that where only small amounts of glycerin (1 per cent in bouillon) are present the tubercle bacillus produces an alkalin reaction. When a slight acid reaction in 1 per cent glycerin bouillon is present, this is due to a disintegration process. "The difference in the reaction of 1 and 4 per cent glycerin bouillon in the human type after three months is probably due to acid production in glycerin not used up in the growth of bacilli. Under the conditions and with the amount of peptone, etc., supplied it is evident from the results that from 1.5 to 2 per cent glycerin represents the average amount utilizable. With increased amounts of peptone, etc., and the neutralization of the acids formed, more glycerin may perhaps be consumed."

In order to determine the correctness of Griffith's statement that the degree of acidity produced is a function of the amount of growth rather than being specific of a type, the author performed some tests, the results of which show that where acids are produced the bulk of growth does not seem to increase beyond a certain limit, this being dependent upon the amount of glycerin present, and probably because the acids inhibit. The diagrams also "prove that 2 per cent glycerin in bouillon is not sufficient to bring out the differences between the bovine and the human type in all strains."

An experiment to determine the behavior of the bovine and human type of bacilli in the presence of dextrose showed that in a flask containing acid bouillon without either dextrose or glycerin only a slight multiplication of the bacilli took place. Flasks containing dextrose remained practically neutral. The author does not believe dextrose a good substitute for glycerin. All claims of transformation by passages of the human into the bovine type or vice versa must, according to him, pass the test of the reaction curve as well as the others before such transformations can be accepted as accomplished facts.

The relative importance of the bovine and human types of tubercle bacilli in the different forms of human tuberculosis, W. H. Park and C. Krumwiede, Jr. (*Jour. Med. Research, 23 (1910), No. 2, pp. 205–368; Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 47 (1910), No. 22–24, pp. 673–680*).—These investigations were conducted for the purpose of determining the relative importance of human and bovine types of bacilli in the prevalence of tuberculosis in man. The cases selected were taken without regard to the age of the patient or the type of the disease. The bacterial cultures employed were in every instance isolated through the guinea pig and egg media were used to cultivate the various strains obtained.

When using Lubenau's medium (glycerinated egg) the bovine type of bacillus could only be sparsely propagated or not at all, while the human type flourished. The authors believe this to be a good differential method.

To control the difference between the plain egg and the glycerinated egg media the investigators made use of a glycerin-potato medium free from coagulable protein. It was noted that when adding glycerin bouillon to the egg media for growing the bacilli from the egg to the bouillon, the virus of the bovine type failed to form a pellicle in the first few generations, whereas on the other hand, the human type formed a pellicle at the outset without any trouble. Slightly perceptible differences alone could be noted in the morphology of the bacilli, and only when they were cultivated through some generations.

As regards virulency, the bovine type was found to cause generalized tuberculosis in rabbits in doses of 0.01 mg. when given intravenously. Human virus when employed in the same dose never produced a generalized tuberculosis, and in many instances it produced nothing at all. Although there is a slight tendency to generalization in doses of 1 mg. of human virus, the average findings showed that the dose may be localized in the same organ as with the 0.01 mg. dose.

Where the virulency for calves was tested the injection was made subcutaneously and in 50 mg. doses. The human type of bacillus caused only local lesions, while the bovine bacillus caused a progressive form of the disease. The authors believe the time for the necessity of using calves for routine differentiation has passed.

According to the authors, all bacilli in cattle and man fall into two types, the bovine and the human, and the various types can be distinguished culturally with surety. Numerous strains of bacilli which were reisolated from calves did not show any change from their previous characteristics. It appeared that the resistance in calves was from 140 to 142 days. Forty-four of the strains were tested with the Smith reaction, and 2 viruses which were isolated from man (human type) gave typical bovine curves.

The results of numerous examinations of the bacilli from 297 patients above 16 years of age showed that only in one instance was a bacillus found of bovine origin. Among 54 cases where the ages ranged from 15 to 16, 9 were infected with the bovine type, and in 22 out of 84 children under 5 years of age the bovine type was also found. In order to correlate and compare their findings with other investigators, 1,040 cases were taken from the literature, and from this it was noted that out of 686 tuberculosis subjects 16 years of age or over, 9 had the bovine type of bacillus, while in 132 cases between the ages of 5 and 16 years, 13 were infected with the bovine type, and out of 120 tuberculous subjects under 5 years of age, 59 had the bovine type of bacillus. The greater portion of the infection by the bovine type of bacillus manifested itself by attacking the cervical glands and also within the abdominal cavity. The bovine type evidently plays an important and very significant part in the tuberculosis of the child, and thus prophylaxis must be extended to its exclusion.

Studies in regard to antigen formation on protein-free nutrient media.—I, Tuberculin, E. Löwenstein and E. P. Pick (*Biochem. Ztschr., 31 (1911), No. 1-2, pp. 142-152*).—The results show that it is possible to obtain an active tuberculin from a protein-free medium and as a true metabolic product of the tubercle bacillus. It is a heat-stable, dializable, and alcohol-insoluble substance which does not yield the biuret reaction, but is precipitable in an acid solution with tannic acid, potassium mercuric iodid, and mercuric sulphate, and is decomposed by a pepsin-hydrochloric acid solution, and by a trypsin-sodium bicarbonate solution.

Immunization of cattle against tuberculosis, E. C Schroeder and J. R. Mohler (*Amer. Vet. Rev., 38 (1910), No. 2, pp. 161-183*).—After reviewing the literature on the subject and the present status in regard to the efficiency of the various measures for immunizing cattle, the authors give a preliminary report of their work on calves with von Behring's, Pearson's, and Heymann's methods. In addition, some tests are reported in which an attempt was made to confer immunity by subcutaneously injecting tubercle bacilli of various degrees of virulence and by transfusion of blood from artificially immunized animals to susceptible animals.

From the work it is seen "that 3 of the 9 cattle treated according to the method of von Behring and afterwards exposed contracted tuberculosis, that one of the 9 cattle treated by the method of Pearson and afterwards exposed contracted tuberculosis, and that of 14 checks or untreated control animals 12 became infected on exposure. Of the 8 animals that received injections of bovine tubercle culture subcutaneously into the ends of their tails (4 old and 4 young animals) all but one young animal contracted disease as the result of the injections. The one that escaped disease from the injection also resisted tuberculosis on exposure. Of the 5 cattle that received human culture injections into the ends of their tails 2 became immune without inoculation disease, 2 were immune but had slight inoculation disease, and 1 had both inoculation and exposure disease. The injection of tubercle cultures under the skin of the neck of animals caused them all to contract tuberculosis.

"Careful autopsies of the cattle treated by intravenous inoculations of tubercle bacilli, according to the methods of von Behring and Pearson, show that the more or less attenuated tubercle bacilli that engender immunity against tuberculosis rarely leave the treated subjects wholly free from lesions that can be accounted for in any other way than as due to the pathogenic activity within the animal's body of the injected bacilli. . . ."

In addition to the above, "12 cattle and 10 hogs were inoculated with Heymann's capsules. The animals were divided into three groups, and one group of hogs and cattle was exposed immediately after treatment to a tuberculous environment, a second about two months later, and a third about two months after the second. With each group of hogs a similar number of untreated hogs were exposed as checks. . . . Among the Heymann's treated hogs one contracted generalized tuberculosis from the treatment and one died prematurely as the result of an injury. When the remaining 8 hogs with their 10 checks were killed, after an exposure to natural infection varying from 8 months to a year, all the principals and checks were found to be affected with tuberculosis Not one of either lot had escaped the disease, and the lesions in the treated animals were in no respect different from those found in the checks. Hence, it is very clear that Heymann's method is absolutely worthless for hogs."

In regard to the transfusion tests it could be noted "that the experiments gave wholly negative results, and hold out no encouragement as being a means by which tuberculosis can be treated or the resistance to infection strengthened."

The authors finally conclude that "no system of bovo-vaccination has reached a stage at the present time that justifies its use in common practice."

Onchocerciasis in cattle, with special reference to the structure and bionomic characters of the parasite, R. T. LEIPER (*Rpts. Local Govt. Bd. [G. Brit.], Pub. Health and Med. Subjs., n. ser., 1911, No. 45, pp. 6–16, pls. 3; Jour. Trop. Med. and Hyg. [London], 14 (1911), No. 6, pp. 87–93, figs. 13*).—"The parasitic nodules in Australian beef are, without exception, due to the presence of long thread-like worms of the genus Onchocerca. The diseased condition, onchocerciasis, is not peculiar to Australian cattle, but occurs also in other animals and in various parts of the world, including the United States of America. The parasites belong to a group of worms that require to be taken up by a biting insect, and to undergo a certain degree of development therein before they can be transmitted to another warm-blooded animal. The worms and their young do not appear to be capable of surviving for more than a few hours the death of the cattle. No evidence of the vitality of the worm or its embryo has been met with in the case of Australian beef reaching this country." The direct development of the parasite in man as a result of eating infected meat is impossible. The nodules are the product of changes taking place in the tissues as a result of some acrid toxin excreted by the worms. In the author's opinion their presence in meat intended for human consumption is undesirable for this reason.

A bibliography of 15 titles is appended.

The forensic detection of newly lactating cows, J. Bauer and M. Sassenhagen (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 8, pp. 141–144, figs. 2*).—As it often becomes a legal question as to whether a certain cow is in the first stages of lactation, the authors discuss the various criterions, such as the presence of a calf, its age, witnesses of the birth, the puerperal changes in the genitals and udder, the condition of the mammary gland and its secretion, and the value of the complement-binding or fixation method for testing the secretion. The method for making the hemolytic test is described in detail.

Treatment of prolapsus uteri, R. Groág (*Allatorvosi Lapok, 33 (1910), No. 15, pp. 171, 172; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 8, p. 134*).—The author replaced a prolapsed uterus in a cow in a lying-down position, using no antiseptics except a little lukewarm water.

The occurrence and significance of streptococci in milk, J. Baehr (*Vorkommen und Bedeutung der Streptokokken in der Milch. Inaug. Diss., Univ. Bern, 1910, pp. 74, pl. 1*).—Only 2 out of 81 samples of milk collected in Düsseldorf and thereabouts were found to contain the *Streptococcus pyogenes*. In one of the two cases their presence was due to udder disease. In almost all of the milks (75 per cent) streptococci could be detected with Petruschky's method. They were identical with the *Streptococcus lacticus* described by Kruse, and probably originated from the feces.

Investigations in regard to white scours in calves, C. Titze and A. Weichel (*Arb. K. Gsndhtsamt., 33 (1910), No. 3, pp. 516–558*).—Following a detailed review of work already reported in regard to this disease, the authors give the results of their biological and enzootiological investigations, which were begun in June, 1908.

In the biological work 210 calves' dysentery strains from various sources were examined and compared with various strains of human dysentery and other intestinal bacteria. Out of the 210 strains, 160 were found to be *Bacterium coli communi*, 24 *B. enteritidis* (Gärtner), 16 pseudocoli bacilli, 4 paracoli bacilli, and 2 strains each of *Bacillus paratyphosis B*, *B. lactis aerogenes*, and *B. proteus mirabilis*. A bacillus was also isolated which stands intermediately between the Gärtner bacillus and the paratyphoid B bacillus, and which was differentiated from the former only by the agglutination test, as in other respects it was the same. The authors propose the name of *Bacillus paracoli* for it.

It was furthermore noted that the clinical manifestations of white scours could be produced with the dysentery coli bacillus, pseudocoli bacillus, Gärtner's bacillus, and paracoli bacillus, and in rare instances with the paratyphoid B bacillus. The Gärtner bacilli and the paracoli bacilli were found to produce the severest forms of the disease in suckling calves. On autopsy in many instances the paracoli and paratyphoid B bacilli were found in the muscles and organs of the same calf, and from this the authors conclude that the disease is probably not a specific one. The bacilli were excreted in the urine and feces from the infected animals.

The authors further found that in most instances the infection was extrauterine, and in the majority of cases the infective agent was taken up with the food. The strains of the dysentery bacterium causing the disease in man could not be noted in the enzootics investigated, nor were the authors able to note any relation of the *Bacillus pyocyaneus*, *B. proteus*, and the various species of cocci to the disease in calves. The question of the dissemination and combating of the disease is also discussed.

"Garrotilho" of hogs, A. Carini (*Rec. Méd. Vét., 87 (1910), No. 2, pp. 56–58; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 48 (1910), No. 8, p. 227*).—Under the name of "garrotilho" a sporadic disease of hogs occurs in Brazil which is characterized by a progressive enlargement of the cervical glands and an edematous infiltration in the locality of the pharynx and trachea. Symptomatically it shows dyspnea associated with an audible bruit and difficulty in swallowing. Death generally occurs suddenly and a few days after the onset of the disease as a result of asphyxiation. Anthrax bacilli were isolated from the glands.

A case of prolapsed rectum in a hog which was treated surgically, P. Görögh (*Állatorvosi Lapok, 32 (1909), No. 46, p. 566; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 8, p. 134*).—A case is reported in which a rectal prolapse extending about 20 cm. outward was successfully treated by resecting the necrosed section of the gut.

Hog cholera and state vaccination, J. F. Stanford (*Arkansas Sta. Circ. 12, pp. 8, figs. 5*).—This is a popular account of hog cholera and its prevention through the use of hyperimmune serum. An appropriation of $2,000 made possible the preparation and distribution of antihog-cholera serum in Arkansas. The work was taken up by the department of bacteriology and animal pathology in cooperation with this Department during the spring of 1907 and continued until July 1, 1909, when it was transferred to the department of veterinary science of the college.

The significance of the microscopic blood examination for the infectious diseases which occur in the horse, with particular reference to diagnosis and prognosis, F. Berger (*Die Bedeutung der mikroskopischen Blutuntersuchung bei den Infektionskrankheiten des Pferdes in bezug auf Diagnose und Prognose. Inaug. Diss., Univ. Bern, 1909, pp. 87, pl. 1*).—After reviewing the existing work on the histology, physiology, and pathohistology of the blood of the horse, the author details his own results with horses affected with strangles and influenza.

It is shown that in equine influenza a hyperleucocytosis is usually present, but that the amount has no relation to the degree or severity of the disease. No parallel could be noted between the leucocytosis and the height of the fever. It was further noted that the percentage of neutrophils is changed, the polymorphonuclears increasing at the expense of the mononuclears, and the eosinophils disappearing at the height of the disease but beginning to return when the inflammatory process begins to subside. In strangles at its initiation a very slight leucocytosis is present, but this increases when the glands begin to swell and remains high until the abscess has fully formed, after which the leucocytes begin to fall to the normal amount again. A parallel exists between the leucocytosis and abscess formation. If a new swelling is produced, then the leucocyte content begins to rise anew and goes through the usual cycle.

The above hematological findings are compared with the results obtained by the author with normal animals.

The use of Gans' polyvalent serum against strangles, A. Schwarz (*Die Anwendung von polyvalentem Druseserum Gans. Inaug. Diss., Univ. Bern, 1909, pp. 87*).—As a protective vaccination with foals this serum in the hands of the author gave good results.

In regard to the curative value of the serum, he first points out that other conditions which are accompanied by swollen glands may be easily mistaken for strangles, but he considers a case strangles only when purulent coalescence of the glands has taken place. If a marked enlargement of the throat glands is present, or if they have gone on to abscess formation, the serum, even if injected repeatedly, will not influence the course of the disease and will seldom prevent the occurrence of complications. In about 20 per cent of the cases treated the author was able to note that on the day following the injection a recession of from 0.4 to 1.8° C. in the temperature took place and that the nasal flow was checked, but 2 days later the temperature resumed its high level again, the nasal secretion took on its original character, and the process in the glands went on.

Accessory thyroid tissue within the pericardium of the dog, J. L. Swarts and J. L. Thompson (*Jour. Med. Research, 24 (1911), No. 2, pp. 299–308, pl. 1*).—In 21 of the 24 animals showing pericardial thyroids, the structure of these bodies corresponded almost identically with the structure of the thyroid glands of the same animal. The exceptions were two colloid goiter dogs and one animal with hyperplastic thyroid, all of which showed normal pericardial thyroids.

In regard to the refraction of the dog's eye, R. Boden (*Über den Refraktionszustand des Hundeauges. Inaug. Diss., Univ. Bern, 1909, pp. 52, pl. 1, figs. 4*).—The eyes were examined of 100 dogs, consisting of various breeds and ages, and of both sexes.

The results show that the average dog is myopic, this being on the average equivalent to 3 diopters. The limits found were from 1.5 to 6 diopters. The various methods for determining the refraction of the eye are discussed, but for dogs the author considers Schmidt-Rimpler's method to be the best.

Bacillary white diarrhea of young chicks, L. F. Rettger (*Abs. in Science, n. ser., 33 (1911), No. 849, pp. 547, 548*).—A continuation of investigations previously noted (E. S. R., 22, p. 489). The author reports having found *Bacterium pullorum* present in the ovary of a pullet less than 8 months of age and one of the survivors of an infected flock, thus showing the laying hen to be a bacterium carrier.

On a possible cause of pneumo-enteritis in the red grouse (Lagopus scoticus), H. B. Fantham and H. H. Smith (*Proc. Zool. Soc. London, 1911, I, pp. 46, 47*).—The authors state that of a lot of 40 grouse chicks 17 died between the ages of 4 to 6 weeks. Upon examination the birds were found to be suffering from coccidiosis, the parasites (*Eimeria [Coccidium] avium*) occurring especially in the duodenum and ceca. As many of the young birds also presented symptoms of pneumonia, the lungs, trachea, and bronchi of the birds were carefully examined.

Coccidian oöcysts were found in the trachea, bronchi, and bronchioles. "Inside these oöcysts the processes of formation of the four sporoblasts were sometimes found to be going on. The oöcysts were probably acquired by the mouth, and a few of them, instead of passing directly down the digestive tract, as is usual, may have found their way, via the glottis, into the trachea and bronchioles."

RURAL ECONOMICS.

Banking and its relations to our agricultural interests, J. R. Mulvane (*Bien. Rpt. Kans. Bd. Agr., 17 (1909–10), pp. 562–569*).—In this address before the board of directors of the Bank of Topeka, the president of the bank discusses the economic relations between banking and farming, showing their interdependence and necessary correlation.

Loans on improved agricultural lands (*U. S. House Representatives, Hearing Before Com. on Banking and Currency, 1911, pp. 8*).—This is the report of a hearing before the House Committee on Banking and Currency on a bill authorizing a national banking association to make loans upon improved agricultural land from "any portion of its funds not exceeding two-thirds of the amount of its deposits not subject to check."

As an argument in favor of the bill it was stated that in 40 national banks in one congressional district in Minnesota there were deposits amounting to $10,662,564.78, of which $6,446,715.01 are time deposits not subject to check.

Credit banks in France (*Jour. Bd. Agr.* [*London*], *17* (*1911*), *No. 10, pp. 844–849*).—The article discusses the actual workings of credit banks in France as provided for by the act of March, 1899.

The progress made is regarded by the French ministry of agriculture as encouraging and it is anticipated that in the course of time such banks will be established in every district of any importance. The following figures show the progress made from 1900 to 1909:

Status of credit banks in France in 1900 and 1909.

	1900	1909
State loans	£24,500	£1,850,000
Number of district banks	9	95
Number of affiliated local banks	87	2,983
Number of members	2,175	138,382
Total amount of loans granted	£76,000	£4,201,000

By the act of March 19, 1910, loans for short periods have been extended and made applicable to "small holdings" for periods as long as 15 years with interest usually at 2 per cent per annum. "The loans are made through the local and district banks, the money being furnished by the State free of interest."

The different forms of rural cooperative [credit] societies (*Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Econ. and Soc. Intel.*, *1* (*1910*), *No. 1, pp. 284–301*).—This article deals with the present state of agricultural cooperation and credit in Italy as administrated by "popular" banks, rural banks, and other institutions.

The "popular" banks were formed in the towns and are especially adapted to serve the great industrial interests, the agricultural middle classes, and tenant farmers, while rural banks have for their principal object the provision of capital to the small freeholders, farmers, and metayers. The "popular" banks in 1870 numbered about 50, with a total capital of 15,000,000 francs, and in 1909 their number was 825, with a total capital of 250,000,000 francs. The rural banks have no initial capital, but receive savings deposits, and when these are not sufficient they borrow from other banks or private individuals. They deal only with their members and have two kinds of loans, one extending over a period of not more than 2 years and the other extending even to 10 years.

The other institutions engaged in agricultural credit have a different historical origin from that of the "popular" banks and rural banks, but the economic principles involved are the same. They make loans for the benefit of agriculture generally, and for encouraging and developing cooperative productive societies, cooperative distributing societies, credit societies for the benefit of laborers, artisans, clerks, small freeholders, etc.

The difficulties of the agricultural bank of Egypt, H. W. Wolff (*Economist*, *71* (*1910*), *No. 3513, pp. 1299, 1300*).—While the author recognizes the very valuable service the agricultural bank has rendered to its country, he points out that "the cause of the trouble which has overtaken the bank is undoubtedly to be found in its system," which resulted (1) in placing heavy indebtedness on the land for unproductive and unremunerative purposes, and (2) in the too free lending of money on the increased market value of land when there was not a corresponding increase in its productive value. "The first mistake made in the organization of the agricultural bank of Egypt is, that under it, real credit, secured by mortgage, is made to serve the purpose of personal, for the provision of working capital for a limited time."

A model cooperative marketing association (*Farmer, 29 (1911), No. 17, pp. 613, 617*).—This article describes the working of the Producers' Cooperative Marketing Association and shows what it is doing in northeast Minnesota in bringing producer and consumer into closer touch with each other and eliminating the speculator.

The principal market is at Duluth, where the association has market places and warehouses supervised by a board of directors and a manager who have authority to grade or reject any produce sent for disposal. As a rule, produce is sold direct to the dealer. A charge of 10 per cent is deducted from receipts of produce to pay for expenses of handling and selling. The market has only been in operation a short time but the amount of business transacted for the first six months amounted to over $30,000.

It is stated that attempts to weaken the association by occasionally offering extra prices for farm produce have been wholly unsuccessful. Members of the association are planting in most cases five times as much land to garden produce as in former years. It is suggested that the plan can easily be carried out in other localities.

[Agricultural cooperative societies in Germany] (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 2, pp. 17–37*).—At the close of 1910 the agricultural cooperative societies in Germany numbered 24,175, including 94 central societies, 15,616 rural credit banks, 2,265 societies for the purchase and sale of supplies, 3,213 creameries, 151 societies for the sale of milk, and 2,836 other societies. Further statistics as to cooperative societies are given and the work of the federations and central institutions of the cooperative societies and of the large agricultural associations is presented and discussed.

New statistics of agricultural cooperation in Austria (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 2, pp. 38–76*).—Data are presented as to agricultural cooperation in Austria, including statistics as to the cooperative credit societies, warehouses, creameries, and federations of cooperative societies.

At the end of 1907 Raiffeisen banks numbered 5,880 with 752,666 members. The total amount paid up on shares was 9,096,743 crowns, and the amount of loans granted by the banks at the end of the year was 428,242,262 crowns. The amount of saving deposits and deposits in current accounts averages 94,612 crowns per bank and 767 crowns per member, indicating a considerable influence of these banks in inducing thrift among the rural population.

Tables and illustrations accompanied by discussions explain the work and success of many other cooperative organizations.

Insurance against accidents in agricultural labor and Signor Luzzatti's bill on the subject (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 2, pp. 151–168*).—This article discusses some of the more important features of the present law in Italy upon accidents in labor generally (E. S. R., 21, p. 492); the bill proposed by A. Conti on the obligatory insurance of peasant laborers against accidents in their labor (E. S. R., 22, p. 91); and the bill presented by Senator Luzzatti to the Italian Senate December 5, 1910. The fundamental points of discussion have been classified as follows: (*a*) Limits of the application of the law; (*b*) systems of compensation; (*c*) persons charged with the cost and apportionment of the cost of insurance; and (*d*) organization of insurance.

Abstract of foreign labor statistics (*Bd. Trade [Gt. Brit.], Abs. Foreign Labor Statis., 4 (1911), pp. 22–25, 30, 31, 34, 36, 80, 81, 98, 114–121, 280, 286–288, 290–292, 300–302, 305, 306, 308, 310, 350*).—Statistical data dealing with labor in the United States and foreign countries are presented, showing the average yearly, monthly, and daily wages of all classes of agricultural laborers, together with tables showing the number of agricultural credit societies, and the capital, membership, loans, and other profits relating to them, and also tables as to accident insurance among agricultural laborers in several foreign countries.

[**Agricultural wages and cost of living**] (*Bd. Trade [Gt. Brit.], Statis. Tables Brit. Self-Gov. Dominions, Col., etc., 1908, pt. 33, pp. 73, 75, 95, 113, 124, 131, 132, 200, 201, 207, 208, 249, 251, 252, 260, 261, 269, 277, 281, 290, 299, 300, 310, 312, 319, 320, 373, 374, 382, 383, 393, 394, 402, 409, 426, 427, 440, 453, 464, 528, 530, 538, 539, 555, 556, 567, 576, 592, 603, 613, 627, 628, 639, 657, 672, 673, 684, 695, 711, 712, 720, 721, 731, 747, 748*).—Tables are presented which give general agricultural statistics, together with the average rates of wages paid for different kinds of labor and the average price of various commodities for each of the years 1906, 1907, and 1908 in the various settlements of the British self-governing dominions, crown colonies, possessions, and protectorates.

Agricultural labor in the United Kingdom, C. R. Loop (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 17, pp. 260, 261*).—This is a partial abstract of a report issued by the British board of trade relative to wages and conditions of employment of agricultural laborers in the United Kingdom.

The total average weekly wage of adult male laborers of all classes regularly employed in England is shown to be $4.46; in Wales and Monmouthshire $4.38; in Scotland $4.76; and in Ireland $2.74.

The different classes of workmen are classified as ordinary laborers, horsemen, cattlemen, and shepherds, and the average wage of each is reported. It is pointed out that these earnings will compare favorably with those in industrial towns when the greater cost of living is taken into account. A much higher wage is paid in Scotland in every class than in any of the other parts of the British Islands. Little increase is shown in the average earnings of any of the agricultural laborers for the last few years.

Wages of agricultural workmen, P. McConnell (*Dairy, 23 (1911), No. 265, p. 11*).—The data given in this article are noted above.

Wages and prices of commodities (*U. S. Senate, Hearings Before Select Com. on Wages and Commodities, 1910, vols. 1, pp. 1–658; 2, pp. 659–875; Digest, pp. XCV*).—This is a report of the hearings before the Select Committee of the United States Senate to investigate the wages paid by different industries and the prices of both raw and manufactured materials. Testimony is given by men experienced in the various methods of production and distribution of those commodities which go to make up the cost of living and the basis upon which wages are generally determined. Data are given showing the wages paid farm hands for a period of years, the prices paid for farming implements and supplies, the actual cost of producing various farm products, and the prices of such products on specified dates.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13 (1911), No. 5, pp. 33–40*).—Statistics and notes are given upon the condition of crops May 1, 1911, with comparisons with previous years, farm value and range of prices of important crops and products, cost of producing wheat in 1909, acreage and yield of cotton in 1910, temperature and precipitation statistics, monthly receipts and stocks of eggs and poultry in the principal cities of the United States, and other data.

Agricultural statistics, 1910 (*Bd. Agr. and Fisheries [London], Agr. Statis., 45 (1910), Nos. 1, pp. 199; 2, pp. 101–190*).—The report contains tables of agricultural statistics showing the total acreage and yield per acre of each of the principal crops in the United Kingdom in each year from 1895 to 1910 inclusive, together with live stock returns and prices of agricultural products.

Summary of commonwealth production statistics, for the years 1901 to 1909, G. H. Knibbs (*Commonwealth Bur. Census and Statis. Melbourne, Prod. Bul. 4, pp. 128*).—This bulletin contains official statistics pertaining to the total yield, average yield, value, wholesale prices, etc., of the principal agricultural crops and farmyard produce in the several states of the commonwealth of Australia for the season 1909–10, and in addition gives a summary of similar statistics for the years 1901 to 1909 inclusive.

AGRICULTURAL EDUCATION.

The rural school as a community center (*Tenth Yearbook Nat. Soc. Study Ed., 1911, pt. 2, pp. 75*).—This, the Tenth Yearbook of the National Society for the Study of Education, includes the following contributions:

Community work in the agricultural high school, B. H. Crocheron (pp. 9–16).—A description is given of the extension work of the consolidated agricultural high school at Philopolis, Md., this including evening lectures in winter for farmers, short courses once a month for farmers' wives, a literary society for young people, meetings for rural school teachers, and summer problems at home for the high school boys.

The district schools in a county as educational and social centers, Jessie Field (pp. 17–19).—The need of maintaining the thoroughness and efficiency of the general work of the district schools is emphasized. At the same time the need is pointed out of connecting this work with the home interests of the pupil, the agricultural problems through boys' clubs and encampments and the home-making problems through similar work with the girls.

Rural-school extension through boys' and girls' agricultural clubs, F. W. Howe (pp. 20–28).—A review is given of the development and present status of the boys' agricultural club movement in the United States, with descriptions of some of its more striking and interesting phases. The influence of this work is summarized in its bearing upon the individual and the community at large.

Relation of rural school to better housekeeping, E. C. Bishop (pp. 29–33).—The author describes the work done by the state department of education and the college of agriculture in Nebraska in enlisting the interest and cooperation of public school teachers in the developing of sewing and cooking contests among school girls. The work in these contests was done at home and the articles made were exhibited at school, township, county, and state exhibitions.

Rural-school libraries, A. B. Graham (pp. 34–43).—The development of the rural-school library is outlined and its functions discussed, as are also such topics as selecting the books, means of raising funds, and the care of books. A suggestive library catalogue is given.

The rural school as a means of developing an appreciation of art (indoor and outdoor), O. J. Kern (pp. 44–52).—This paper is essentially a review of the 12 years' work of its author for better school buildings and more artistic school surroundings and indoor decorations in Winnebago County, Ill.

Organized recreation in rural schools, M. T. Scudder (pp. 53–59).—Data are given concerning some practical experiments in organizing rural school recreation in country schools in New York State.

The general problem of the relation of the rural school to community needs—a summary, B. M. Davis (pp. 60–66).—In this article the more important features of the preceding chapters are summarized and some related data are given.

Bibliographies prepared by the United States Bureau of Education and by the editor of the yearbook are appended.

Agricultural education, J. Macdonald (In *Stephen's Book of the Farm. Edinburgh and London, 1908, vol. 1, 5. ed., rev., pp. 30–37*).—This is a brief review of the development of agricultural education in Great Britain, in which are considered the older teaching centers, the modern agricultural colleges in England and Wales, the cooperation of county councils, the agricultural colleges in Scotland, the growing appreciation of agricultural education, aid to agricultural education by agricultural societies, and agricultural education in Ireland.

Indian boarding schools and agricultural education, L. Chubbuck (*[Washington: Govt.], 1911, pp. 5*).—In this account, printed for the use of the House Committee on Indian Affairs, a summary is given of the work that is being done by the United States in the maintenance of a system of schools for Indian children. There are two classes of schools, day and boarding. The day schools, of which there are at least 150, are located on the reservations and may be regarded as miniature farm schools. The boarding schools are divided into two classes, those located on the reservations and those that are not. The boarding schools are, in theory, distinctively industrial in the direction of agriculture.

Agriculture in the public schools, L. S. Ivins (*Lebanon, Ohio, [1909] pp. 156, pls. 8*).—The object of this book is to furnish a guide for teachers in the rural schools who are expecting to prepare a course of study that will include the subjects of nature study and elementary agriculture. It also furnishes helpful suggestions on parents' meetings, public displays of school work, corn, potato, and vegetable growing contests, and home, rural, and city school flower gardens. Courses of study prepared by the state department of education of Ohio are given for third grade high schools (two-year course), second grade high schools (three-year course), and first grade high schools (four-year course).

Agriculture for schools of the Pacific slope, E. W. Hilgard and W. J. V. Osterhout (*New York, 1910, pp. XIX+428, figs. 209*).—This book covers a great many topics in an elementary way and is intended for use in parts of the humid as well as in the entire arid region. About two-thirds of its space is devoted to such subjects as plant needs, how the leaf gets food from the air, plant propagation and improvement, the influence of surroundings on the structure of plants, and the foes, friends, and diseases of plants. The various field crops follow and brief consideration is given to animal physiology and the various farm animals.

Some agricultural projects for elementary schools (*Bul. Bd. Ed. Mass., 1911, No. 1, pp. 53, figs. 25*).—This manual is divided into four parts: Directions for conducting 14 projects in farming, suggestions for garden work, 12 laboratory exercises, and collateral work which shows how letter writing, cooking, geography, arithmetic, drawing, and themes may be taught with an agricultural point of view.

Practical agriculture for rural schools, A. B. Graham (*Agr. Col. Ext. Bul. [Ohio State Univ.], 6 (1911), No. 6, pp. 15, figs. 22*).—This bulletin contains suggestions to teachers for conducting experiments with growing crops, making observations and collections, and identifying specimens. These are followed by lists of helpful books, bulletins, and other publications.

Southern field crops (exclusive of forage plants), J. F. Duggar (*New York, 1911, pp. XXVII+579, figs. 222*).—This book adds one more to the Rural Textbook Series edited by L. H. Bailey. The author had in mind in the preparation of this text the needs of two classes of individuals: "Students desiring a full and practical, yet logical and pedagogical treatment of the staple crops of the

South, and farmers seeking a simple presentation of the scientific principles underlying agriculture, together with a condensed statement of the results of recent experiments and experience." The book is intended especially for high schools and normal schools, and when so used the author recommends that all the matter printed in small type and all technical names in parentheses be omitted. It is also intended to serve as an outline for college students. Eleven chapters are devoted to cotton, eight to corn, and one to each of the other important field crops of the South. Forage crops are omitted.

The type of teaching method presented is one that sends the learner directly to the plant in the field, to make careful observations from the tip of the root to tip of top. The treatment of wheat, which is typical of that given to all the crops considered, is in outline as follows: (1) Structure and composition, including roots, stems, leaves, pollination, the spike and the spikelets, the grain, and composition; (2) species and varieties, including the winter wheats of the cotton belt, the most productive varieties, means of distinguishing varieties, qualities desired in varieties for the South, and the improvement of varieties; (3) the kind of soils, the place in the rotation, and the fertilization of wheat; (4) cultural methods as to the preparation of land, when to sow, drilling *v.* broadcast sowing, and large *v.* medium and small seed; (5) harvesting; and (6) the enemies of wheat. Laboratory exercises and references to literature are furnished at the close of each chapter.

Boys' and girls' potato and corn primer (*Mass Agr. Col., Dept. Agr. Ed. Circ. 12, 1911, pp. 8*).—Directions are given for the culture of potatoes and corn. References for the further study of each are added.

The potato experimenter's primer (*Mass. Agr. Col., Dept. Agr. Ed. Circ. 13, 1911, pp. 8*).—The primer is intended for use by a boys' potato culture club. It contains directions for making 5 experiments in potato growing, such as testing (1) the comparative value of different tubers, (2) the value of treatment for scab, (3) the effect of cutting potatoes into large and small pieces, (4) the best depth for planting, and (5) the difference between the product of large and small potatoes.

Our conebearers and evergreens, C. H. GOETZ (*Agr. Col. Ext. Bul. [Ohio State Univ.], 6 (1910), No. 4, pp. 16, figs. 17*).—Lessons are outlined which are intended to give school children an opportunity to become better acquainted with a few of the more common cone-bearing and evergreen trees.

Forests of New York, G. M. WILEY (*N. Y. State Ed. Dept., Arbor Day Ann., 1911, pp. 53, pl. 1, figs. 31*).—Outlines are given on the teaching of forestry along with the geography, agriculture, civics, and physical geography. A list of postgraduate and undergraduate schools of forestry as well as a reference list of forestry books is included.

Alabama bird day book (*Montgomery, Ala: Dept. of Game and Fish, 1911, pp. 60, pls. 11*).—The material in this pamphlet was prepared with a view to assisting teachers in celebrating bird day by a study of the principal birds to be found in Alabama. A suggestive program is given.

Reading list on birds and bird study (*Buffalo: Grosvenor Library, 1909, pp. 15*).—This is a selected list of books and magazine articles of interest to those interested in nature study and out-of-door life. The list covers, among others, such subjects as bird study in the school, flight and migrations of birds, photographing birds, and bird protection.

Farm and home mechanics, some things that every boy should know how to do and hence should learn to do in school (*U. S. Dept. Int., Off. Indian Aff. [Pub.], 1911, pp. 48, pls. 5, figs. 28*).—The purpose of this manual is to set forth the results of practical experience in the work of instruction in the Indian schools. A suggestive list is given containing a number of "common articles that have to be made for every home and on every farm, together with a number of processes with which every boy should be familiar." Line drawings illustrate the details of the more difficult articles.

Farm accounting and business methods, J. A. Bexell (*Springfield, Mass., 1911, pp. 161, figs. 2, dgm. 1*).—This is a textbook for students in agriculture and a manual for home study. It is divided into four parts, namely, financial accounts, cost accounts and special records, business organizations, and useful tables.

Lessons in farm accounting and business methods, J. A. Bexell (*Springfield, Mass., 1911, pp. 27*).—This is a syllabus of instruction sheets for use in connection with the above-named textbook. A loose leaf book accompanies the syllabus and furnishes models for keeping the cash book, inventories, personal accounts, statements, household accounts, and special records such as a milk record, a feed record, a daily labor record, a stock record, a breeding record, and a sales record.

A pioneer's experience in school gardens, J. W. Jones (*Jour. Ed. [Boston], 73 (1911), No. 14, pp. 377-379, dgm. 1*).—As a remedy for eight difficulties which beset a successful school garden, the sections plat system, which combines individual work with community work and responsibility, is recommended.

Annual report, New York City branch of the National Plant, Flower and Fruit Guild (*Nat. Plant, Flower and Fruit Guild, N. Y. City, Ann. Rpt., 14 (1910), pp. 28, figs. 5*).—One of the features of this report is an account of the maintenance of a children's farm garden in the heart of one of the most congested sections of the city.

Bibliography of science teaching (*U. S. Bur. Ed. Bul., 1911, No. 1, pp. 27*).—Under the subject of biology this takes up (1) articles relating to the teaching of biology as a whole, (2) articles on general science with special bearing upon biological subjects, (3) botany, and (4) zoology. It also deals with chemistry, geography, mathematics, nature study, and physics.

MISCELLANEOUS.

Report of the director for the year ending June 30, 1910, F. B. Mumford (*Missouri Sta. Bul. 96, pp. 603-624, fig. 1*).—This contains the organization list of the station, a report of the director summarizing the various activities of the station during the year, lists of exchanges and donations, and a financial statement for the Federal funds for the fiscal year ended June 30, 1910.

Twenty-first Annual Report of New Mexico Station, 1910 (*New Mexico Sta. Rpt. 1910, pp. 38*).—This contains the organization list, a report of the director on the work, publications, and exchanges of the station, departmental reports on the various lines of station activities during the year, and a financial statement for the Federal funds for the fiscal year ended June 30, 1910. The report of the animal husbandry department is abstracted on page 272 of this issue, and a portion of that of the horticulturist on page 238.

Thirty-second Annual Report of North Carolina Station, 1909 (*North Carolina Sta. Rpt. 1909, pp. 151+117, figs. 124*).—This contains the organization list, reports of the director and heads of departments, of which those of the poultryman and entomologist are abstracted elsewhere in this issue, a financial statement for the fiscal year ended June 30, 1909, numerous special articles abstracted elsewhere in this issue, and reprints of press bulletins entitled Selecting Seed Corn for Larger Yields, by C. B. Williams, The Apple Bitter Rot, by F. L. Stevens, Suppression of Terrapin Bugs, by R. I. Smith, and Spring Destruction of Terrapin Bugs, by R. I. Smith, and of Bulletins 200-204, previously noted.

NOTES.

Connecticut State Station.—Wilson H. Lee, of Orange, has been appointed a member of the board of control to succeed Charles M. Jarvis, resigned.

Delaware Station.—A. C. Whittier has resigned as assistant in nutrition in the Ohio Station to accept a position as research chemist.

Indiana Station.—G. G. Carter, inspector in the fertilizer and feeding stuffs control work, has resigned to accept a commercial position.

Kentucky University.—State Commissioner of Agriculture M. C. Rankin has announced that he will offer a scholarship of $100 in the agricultural course to the boy making the highest score in stock judging at the state fair. A similar amount is offered for prizes to the five college students making the best score.

New Jersey Stations.—Dr. B. H. A. Groth, plant physiologist in the College Station, has been granted a leave of absence for two months to study certain plant problems in Europe. Miner S. Macomber, an assistant chemist in the State Station, has resigned.

Ohio State University.—During the 10 months from July 1, 1910, to May 1, 1911, the agricultural extension department has conducted 79 agricultural extension schools for men and 75 domestic science schools for women, with an attendance of 17,000; 7 agricultural trains, on which lectures were given to 16,000 people; 125 orchard pruning and spraying demonstrations, with an attendance of 12,500; and other public meetings which bring the total number of people reached in these ways up to nearly 49,000. The department also made exhibits at 12 county fairs, at the National Corn Show, and the state apple show; made 123 school visits in the interest of agricultural and domestic art contests; and is conducting 200 boys' corn contests and girls' sewing and baking contests, with a membership of about 12,000. Monthly plate copy has been furnished to 148 county newspapers, 30,000 copies of the Agricultural College Extension Bulletin issued each month, 6 issues of the Farmers' Reading Course Bulletin of 5,000 copies each prepared, and a like number of the Home Makers' Reading Course Bulletin published, with supplements on corn, grain drills, poultry, dairying, drainage, pruning, spraying, and methods of teaching agriculture of from 10,000 to 25,000 copies each. In connection with these various activities the department has sent its representatives to numerous other meetings, and 6 instructors have visited farmers for the purpose of giving expert advice on farm matters. For the ensuing year there are already 91 applicants for agricultural extension schools in 66 counties, 6 agricultural trains for August, 1911, 3 agricultural trains at other times, 170 applicants from newspapers for plate copy, and 45 requests for exhibits at county fairs.

Oregon College.—*Science* notes that Juliet Greer, dean of the school of domestic science and art and professor of domestic science, has resigned to take effect July 1.

Washington College and Station.—W. S. Thornber, head of the department of horticulture, has resigned to engage in the supervision of horticultural work to be undertaken by two land improvement companies in Idaho. In connection with this work it is contemplated to carry on demonstration tests and to give instruction in a school of horticulture to be opened in 1912

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EXPERIMENT STATION RECORD.

Vol. XXV. September, 1911. No. 4.

In weighing the advantages of a calling or a field of work the apparent returns and compensations naturally come in for prominent consideration along with the tastes and inclinations of the individual. This is true when a career is being selected or when a change of position or of occupation is contemplated. If the calling or the position is a commercial one, the standards of business will naturally weigh heavily, but if it is a scientific career, quite different standards and considerations should prevail, and as between the two spheres there are wide distinctions to be taken into account.

These distinctions and standards are not appreciated by the world at large and they are not always fully taken account of by either young men or those already engaged in scientific work. This is evident from the experience of men connected with our agricultural colleges and experiment stations. Too often the pecuniary consideration temporarily overshadows all others and the standards of business success shut out a just appreciation of very real compensations which should have large influence with the man of science. This turns young men from the field of teaching and investigation and leads to dissatisfaction and unrest among those engaged in it. Not infrequently men compare their work and its returns with those of a commercial or professional career, to its apparent disadvantage, because its special conditions and compensations are temporarily lost sight of. The opportunity for increased salary and the ultimate possibilities in business loom large in the horizon and lead even specially trained men to abandon a scientific career, often to their regret after a short experience.

Commercial and professional positions undoubtedly hold out larger material rewards to the men who are able to command them, and they probably always will. As a result there is a danger that the standards and rewards of the market place will fill an undue portion of the horizon of the young investigator, to the exclusion of other and no less important considerations. That this is the case with students in college is evidenced by the experience of the large universities, which have commented on the relatively small number who devote themselves to scientific pursuits, and among those who attend our agricultural colleges the call to the farm or other agricultural pursuits and the opportunity which is now open deter all but the occasional student from advanced study.

"Scientific farming" has become a popular phrase and the appreciation of the man who can couple science with his farming or apply it to various branches of the agricultural industry has made a large and increasing demand. Those entering upon agricultural investigation are thus especially exposed to temptations to abandon their work, and particularly if they have not fully caught the spirit and the appeal of scientific work they are likely to be attracted or distracted by the financial returns of modern orcharding or special farming and long to see the results of their effort measured in bushels or tons or dollars of increase.

This is a matter of no little importance to the success of our agricultural institutions. The colleges must prepare men for the business and professional sides of agriculture, but somewhere and somehow bright, capable men must be had for the great and growing work of education and investigation. The inclination to enter it is partly temperamental and depends upon an outlook and a point of view which the colleges can do much to inculcate. If such a career can not hold out as large remuneration as some other callings, the other compensations of real worth deserve to be understood. It may be profitable, therefore, to consider some of the characteristics and distinctions of such a life work and its ability to satisfy the aspirations of men who are by nature attracted to it.

A scientific career is one of service to human welfare and advancement. It thus affords an opportunity to do the world's work and to take a vital part in the progress of civilization. Science and education are two of the great civilizing agencies of the world. The real force of this is beginning to be more widely appreciated. As a recent writer has said, "Science is the one great motive force of modern civilization on which all progress, all wealth, and even all existence increasingly depend."

The German mind realizes that the wealth and well-being of the Empire must ultimately depend on science and it expresses this feeling in the high position it accords to men of that calling. At every great state function in that country a prominent place is assigned to the representatives of pure and applied science.

Science guides judgment and reason and helps to interpret experience. Until we have science, reliance is placed on dexterity, experience, the results of repeated trials, many of them unsuccessful. In this way a purely empirical means is developed, a rule-of-thumb method, which knows not reason and is based on chance, except as it follows the result of wisely judged experience. All experience rightfully interpreted is helpful, but without the knowledge of the reason or the modifying causes and without the application of what is designated as the scientific spirit its interpretation is likely to be misleading and its generalizations erroneous or only half true. Hence the productive worker in science is helping to build the world's knowledge and his work is singularly one of public service.

Assuming that a scientific career as a teacher and investigator has been entered upon because of the appeal which it makes to the individual, the satisfaction which comes from its pursuit is one of its greatest compensations. It makes his life virile, purposeful, productive; it is a carrying out of an impulse which finds its reward in the satisfaction of a deep inward craving—a satisfaction entirely different in kind from that pride which the skilled worker takes in the performance of his task.

As Dr. Armsby has said, "A man may be at least a fairly efficient bricklayer or machinist or farmer or bookkeeper or Government clerk or follow successfully any one of a score of skilled trades without necessarily having any very special desire to do that particular thing rather than anything else. With the investigator it is different. His chief desire, if he be a true investigator, is not to *do* but to *know*—to penetrate behind the appearance of things in nature and learn their secret causes and complex interrelations."

To such a man a scientific career meets his tastes and his natural inclinations. It brings him into an atmosphere, an association, a freedom not found in business. The purpose and the spirit of work are distinctly different, as is the reward. The pleasure that comes in the pursuit of knowledge and its effective diffusion, and especially of knowledge which will find an application in the lives of men in our own generation, is of a different kind from that which comes of success in most other callings. The gratification which follows accomplishment for purely personal ends is not to be compared with it.

The chief interest of the investigator lies, as Prof. Cannon[a] has recently pointed out, in the territory which has not been traversed. "Indeed, he is to be classed with explorers and pioneers. For such men the complacent contemplation of things accomplished is intolerable—they chafe under the routine of established ways, and find the satisfaction of life in adventures beyond the frontiers. . . . The satisfactions of a life devoted to investigation, like the satisfactions of other careers, arise from the profitable use of one's powers. The employment of these powers is perfect freedom, and the immeasurably important results that flow therefrom render the satisfaction of productive scholarship especially keen. . . .

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[a] *Science*, n. ser., 34 (1911), No. 864, p. 66.

"Because every discovery becomes the basis for further discovery, the imagination of the investigator is constantly stimulated. New facts suggest in turn other facts, and point to unexpected relations between things that have long been known. . . . These excursions of the imagination offer repeated suggestions for fresh adventure, the look is always forward to what may be seen when the next step is taken. . . . The chance of beholding unsuspected wonders, or the possibility of finding that something imagined is really true, is a constant incitement to further search, and furnishes the zest and interest which are among the best rewards of the investigator."

The permanent character of scientific work is a large element in the satisfaction which comes from its pursuit. It is not merely the production of something ephemeral, of transient value or use; but it aims at the discovery or application of facts which are lasting. To quote Prof. Cannon again: "The value of labor that brings a revelation of new knowledge does not cease with the day; it remains as a permanent acquisition for the race. There is really great satisfaction to the investigator in this thought of the durable results of the perishable years."

A scientific fact is a permanent product, and the steps by which it is attained are only secondary in value because they lead to a broader and more permanent understanding of the subject. Even though the results do not lead directly to generalizations the work is worth while if well done. What Huxley designated as "the slaying of a beautiful hypothesis by an ugly fact," while often disheartening to the investigator, is not without value in clearing the way. Many negative or inconclusive results are usually necessary to the establishment of a truth. Its attainment is the highest and most enduring product of man's activity.

The service of the man of science is founded on individual effort. It is not merely a drifting along from day to day, doing the routine duties that come to hand, or working as a part of a big system in which the individual is well-nigh lost sight of. It is objective individual effort, which puts a man to the test and brings out the best there is in him. It taxes his knowledge, his ingenuity, his resourcefulness, his perseverance. It is bounded by no limitations except the initiative and industry and ability of the individual.

The position to which a man may advance in his science and its applications is determined only by himself, if the opportunity be given him, and at this time the opportunity will be likely to materialize if the qualities are present to demand it. A great variety of positions varying in grade and in the opportunity they afford are now presented in this country, and unfilled places await men who shall be qualified to take them. This gives an unusual inspiration and incentive to such a career.

Then there is freedom for a man to work out his problem in his own way and largely in his own time. There is no time limit fixed for a project, and no prodding or impatience if it is evident that progress is being made; and there is large latitude for the exercise of individual initiative and judgment. The case is quite different with an industrial specialist. There time is money, and results must be forthcoming to justify the salary and other expense. The keen competition of the commercial world enters into the life of its experts.

There is freedom also in the use of the results of a man's studies, upon which he may build his reputation, his greatest asset. In the case of the industrial expert the product of his work is for the use of the business, and is usually not at his disposal to publish abroad or report to his colleagues in science. This detracts to that extent from the satisfaction which comes of accomplishment, and cloaks the personal element.

Again, the associations and conditions of business life are far different from those in a scientific institution. This is exemplified in many ways and to a degree little realized by men who have followed a scientific career closely. The traditions and standards are different, as are the aims and methods. The whole atmosphere and spirit and the appeal are so different that men rarely shift readily from one sphere of work to the other.

Consideration of the individual is much greater in a scientific institution than in business. The large majority of men in industrial pursuits must work under direction, and take orders from those higher in authority. The opportunity for a specialist to gratify his inclinations and to follow out a special inquiry or test an idea are limited. Permanency in position depends largely on the business point of view.

Appreciation is a large element in the satisfaction which comes of a scientific career. To have one's work understood and recognized is no small part of the reward. Although the reward of the world's praise is no proper part of the aim of the true investigator, such recognition and appreciation gives encouragement which is helpful to most men in maintaining their zeal. And it is a very real reward, for it is of some consequence to win the world's respect and approval for tasks well performed—for a position built upon substantial worth.

Recognition comes first from a man's colleagues and fellow workers in science, who are able to understand the significance of his accomplishment. It is shared by the authorities of his institution, from whom he will derive much of his pride and satisfaction. The latter owe him their encouragement and sympathetic support. The publication of his work is the medium for a wider recognition which is his highest aim—the founding of a reputation which shall endure.

Public appreciation usually comes later, and is really of secondary importance except as it leads to providing the means and opportunity for continuing the researches. The man who caters to it is apt to find himself looking to the renown rather than to the acquiring of knowledge. The introduction of such a motive is a distraction and may readily lead to wrong ideas of success and reward. It is rarely definite or comprehensive unless the character of the work is popular. Too much must not be expected of it. The public is not discriminating, and it may lose sight of the identity of the real author for a time, for the results of scientific work filter down to it slowly and through various intermediate steps. To the average man the fact is more important than the author or demonstrator of it. But more and more the public appreciates the importance of such service in a broad way, and recognizes the class of men engaged in it. It expresses this in an attitude of respect and confidence, and in a position which it involuntarily accords them.

If the man who makes two blades of grass grow where one grew before is a public benefactor, as has long been accepted, the men who are devoting their lives to securing greater agricultural efficiency in all directions compose a band of workers for the world's advancement who will some day be regarded as meriting monuments and memorials quite as much as military heroes, because their work comes close to the public generally and touches their daily lives at so many vital points.

Another compensation is the opportunity which is given for leadership. The conspicuously great man is a product of opportunity. This makes the outlook in the field of agriculture exceptionally imposing. The places of most of the great men of the past are not filled and will not be. Our conditions are changing; the level upon which the average man of to-day lives is fairly high. The specialist has become the successful worker of the day. The great industry of agriculture, so long neglected by the sciences, affords a splendid theater for his effort. There are no more live or far-reaching questions to-day than those which turn about that art, and already the man of science is appealed to with confidence in his ability. The scientific method probably finds no more extensive and important application to social problems at the present time than in this field. The opportunity for leadership which will bring reputation in science and in a national sense is unexcelled.

The relative permanency and stability of position is another element to be considered. Positions in public institutions are each year becoming more permanent in character, and the degree of uncertainty is less for the successful worker than in most other callings. This enables a man to live his life free from worry, and plan for the future with reasonable assurance. While the pension system is not yet general, the demands on a man by his institution are usually decreased with advancing years, and there is leniency and leave of absence in case of illness. Some provision for retirement without entire loss of salary is now available in merited cases at a large proportion of the public institutions.

And what shall be said of the opportunity for gratifying cultured tastes, and for association and sympathetic relations with men of similar tastes and standards and aims in life? These are very real incidents to a scientific career, as are membership in scientific societies, the meeting with fellow workers in all branches of science, and the ability to command a place among them.

The capital of the man of science is his education, his ability, and his standing, which no financial panic can wrest from him. His stock in trade is independent of business conditions or fluctuation in values, and rarely fails to find a market. Competition and the struggle for advantage and supremacy are no part of his activity. Personality is its dominant element.

His work is congenial, stimulating, and inspiring to himself and to others; it is not colored by personal interest or considerations, but is unselfish and public spirited. It is broadening, elevating, lifegiving. It enables him to live an honorable, respected, and satisfying life of usefulness, among congenial associates and surroundings which add much to the pleasures of his daily life. The opportunity which is afforded is at once a man's duty and in a measure his reward, for it is the fulfillment of his ideals.

This is not to say that he should not be well paid—better paid than is very often the case considering the standards of his living, what is expected of him, and his natural ambitions for his family. The value of his service to the community is far out of proportion to the salary he receives or can usually expect to attain. He is usually dependent upon it. He is completely out of touch with means of "making" money. He has isolated himself from such connections and has devoted his life to other ends, public in their final reach.

To him money is not the aim of life—merely a means of providing its necessities and advantages. He need not look to it either as a means of attaining position in the community, for that is accorded him. But beyond the mere necessities of life, salary is to some extent the world's measure of a man's success and attainment, and to him it is a very tangible evidence of appreciation.

The aspirations of the normal man have been summed up by the late President Canfield under three heads: To live, to be a man among men, and to do that which will endure. His words may be quoted here.

"First, to live; not merely to exist. Almost anyone can exist in these days, and especially in this country of ours. Mere existence is so easy and so common that a failure to secure this becomes noteworthy; the starvation of a single person in a population of nearly eighty millions becomes at once such an item of news that it is wired from one end of the country to the other and is commented upon by the daily press under special headlines. But the normal man desires something more than existence. He desires to live, in the sense that he wishes his fair share of those things which give color and meaning to his century. . . . In a word, he must be able to live as a breadwinner and husband and father and good citizen ought to live. This is not only his own right, but the rightful demand of the welfare of the entire community.

"Second, to be a man among men. He is not to be content while he remains unrecognized and unknown. He is not simply a unit to be counted, but a man to be weighed and reckoned with. He wishes to stand shoulder to shoulder with his fellows, to look level in the eyes of other men with a sense of equality and power, to feel that his experience and his observation and his resulting opinions are of value to the world and the value is recognized, that men hesitate as to certain undertakings until they know where he stands. He will not admit that he is only a fraction of a man, but insists that he is at least one of the full integers which make up the sum of life. He is not to be a flint that never strikes fire. His nature desires and demands the esteem and the regard and even the affection of his fellows.

"Third, to do that which will endure. He will have no part in oblivion; he is unwilling to be forgotten; he can not abide the thought that his work is to perish, that all that to which he has given his time and strength and thought and power comes to an end simply because his body dies. He wishes to project his temper and his purpose and his plans into the future, to find in this way and even here the beginnings of immortality, so to labor that at least a part of his finite product may be worthy to be woven in and in with the divine plan and thus become lasting and infinite."

This is a high and a noble ideal. It appeals to the best there is in man. But who shall say that a scientific career in the field of agriculture does not open the way to the realization of these three controlling desires in a high degree? To one with the proper temperament such a career is a challenge to the supreme use of all his powers—to his imagination, his ingenuity, his patience and enthusiasm, and to his spirit of disinterested service.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

An introduction to bacteriological and enzym chemistry, G. J. Fowler (*London, 1911, pp. VI + 328, pls. 4, figs. 28*).—The chapters in this book are as follows: The characteristics of chemical action in living matter; outlines of bacteriological technique; some leading conceptions in organic chemistry; space-isomerism and the chemistry of the sugars; the hydrolysis of starch by amylase; the conditions of formation of amylase in the living cell; invertase and maltase; the alcoholic fermentation of grape sugar; the acid fermentation of alcohols and carbohydrates; the fermentation of cellulose and allied bodies; miscellaneous fermentations, fat-splitting enzyms, oxidases, and clotting enzyms; outlines of the chemistry of albumins or proteins; the nitrogen cycle; the sulphur cycle; fermentation of indigo, tea, cocoa, coffee, and tobacco; bacteriological and enzym chemistry in relation to agriculture; and the chemistry of sewage purification.

A bibliography is appended.

Method for determining whether a liquid contains more than one enzym, Achalme and Bresson (*Compt. Rend. Acad. Sci.* [*Paris*], *151* (*1910*), *No. 26, pp. 1369-1372; abs. in Analyst, 36* (*1911*), *No. 420, p. 110*).—The method rests upon the hypothesis that if a limited quantity of a single enzym be allowed to act simultaneously upon 2 different substrata its action will be distributed between the two. On the other hand, where 2 enzyms are present in a liquid each one of them will act upon a specific substrata and independently of one another.

Microchemical detection of protein, T. Bokorny (*Chem. Ztg., 35* (*1911*), *No. 8, pp. 69, 70; abs. in Analyst, 36* (*1911*), *No. 420, pp. 111, 112*).—The principle upon which the reaction is based is the coagulation phenomena and the formation of proteosomes observed when the subepidermal cells of some plants belonging to the order Crassulaceæ are treated with a solution of caffein. The proteosome formation is noted in the plasma of the cells in superficial sections of the leaf, which generally exists in the form of closely crowded bodies having an angular or a flat, round shape. The proteosomes may be most conveniently studied with Spirogyra.

The effect of high temperatures on cane sugar in solution, N. Deerr (*Hawaiian Sugar Planters' Sta., Agr. and Chem. Bul. 36, pp. 45*).—Continuing previous work (E. S. R., 24, p. 411), "the effect of high temperatures on cane sugar in solution has been studied, and it has been found that at temperatures above 100° C. cane sugar is inverted even in alkaline solutions. The inversion first becomes noticeable at about 110° and increases rapidly with increasing temperature. The connection between rate of inversion at one temperature and at another is given by an expression of the form $C_1 = C_0 e \frac{A(T_1 - T_0)}{T_1 T_0}$, where C_1 and C_0 are the rates of inversion at T_1 and T_0; e is the base of the natural system of logarithm, and A is a constant of value about 35,000.

"Chlorids, bromids, iodids, nitrates, sulphates of the alkalis and alkaline earths, materially increase the rate of inversion at high temperatures in neutral or in alkaline solutions. The action of the neutral salts of the alkaline earths is much greater than is that of the neutral salts of the alkalis. At high temperatures sulphates of the alkalis and alkaline earths, which at lower temperatures retard the rate of inversion, invert cane sugar. Neutral salts of weaker acids act similarly to alkalis and retard inversion at high temperatures. The dominant factor in determining the rate of inversion at temperatures above 100° is the amount of free alkali. The inversion caused by varying quantities of neutral salt is proportional to the amount of salt present. Wilhelmy's law of mass action does not hold as regards quantity of sugar inverted in unit time, but the rate of inversion increases with the time and is about 30 times as great for a 30-minute period as for a 5-minute period.

"The system obtaining in cane juices is a very complex one, consisting of very variable amounts of salts of both strong and weak acids and of free alkali. Hence a temperature which may be safe with one juice may cause serious inversion in another. With the conditions usually prevailing in local factories, juices should suffer a half hour's heating at 120° with no detectable loss of sugar. It would be conservative to adopt this temperature as the highest to which cane juices should be subjected during the process of evaporation, though under a careful system of control and observation a temperature of 125° (or even 130° for shorter periods) might be permissible.

"In the presence of neutral salts of strong acids at high temperatures the isomerization of dextrose is small. It is larger with sulphates of the alkalis and larger still with the alkali salts of weak acids. In the presence of alkalis at high temperatures dextrose is isomerized into a mixture of dextrose and levulose. Simultaneously there is a fall in polarization. The dextrose is in excess of the levulose in proportion about 2:1; a portion of the reducing sugars is destroyed as such, the amount destroyed increasing with increase in alkali.

"When invert sugar is heated [in the presence of neutral salts of strong acids at high temperatures] a portion of the levulose is isomerized to dextrose, the proportion of dextrose to levulose obtaining eventually very similar to what obtains when dextrose alone is heated. As with dextrose, a portion of the reducing sugars disappears and the destruction with invert sugar is comparable to the destruction when dextrose alone is heated. Probably in the presence of alkali a fixed equilibrium between dextrose and levulose obtains, the position of equilibrium being rapidly obtained at high temperatures.

"The sterilization of cane sugar products is possible, since it occurs almost instantaneously at 125°, which is very close to the thermal death point of the most heat resistant sugarhouse bacteria, and since at this temperature in alkaline solution the inversion of cane sugar is very slow.

"The effect of high temperatures on 'clarification' is very small; the most that can be hoped for is a juice from which the dirt might be separated with a little more ease. The dark coloration observed when cane sugar is heated at high temperatures in the presence of alkalis does not indicate a detectable destruction of sugar. The use of high temperature evaporation and the preheater system of evaporation, and also the sterilization of all cane sugarhouse products, is possible under a rational system of control."

Calculation of nonsugars, DEMICHEL (*Bul. Assoc. Chim. Sucr. et Distill., 27 (1910), No. 12, pp. 1177–1179; abs. in Amer. Sugar Indus. and Beet Sugar Gaz., 12 (1910), No. 10, p. 368*).—"A formula for the approximate calculation of nonsugars in sugar products is given as follows: $N=1{,}000\ (D - D')\ (G/G - g)$. In this formula N represents the nonsugar, D the density of the impure product, D' the theoretical density corresponding to the Clerget sugar, g the specific gravity of water at 15.5° C. (equal to 0.99916) and G the specific gravity of the nonsugar which, on the average, is 1.81. By inserting the values of G and *g* the equation becomes reduced to the more convenient form: N=1,000 (D—D′) 2.232."

An electrically controlled constant temperature water bath for the immersion refractometer, H. C. GORE (*U. S. Dept. Agr., Bur. Chem. Circ. 72, pp. 2, figs. 2*).—In this apparatus the inflow of cooling water is regulated automatically by a telegraph sounder pressing upon a rubber outflow tube which controls the admittance of water to the water bath. The thermostat proper consists of a long glass tube filled with mercury, closed at one end and bent into a flat rectangular coil which is fastened to a perforated brass plate resting on feet on the bottom of the water bath. At the open end of the tube is attached a device in which electrical connection is made between the mercury and platinum wires sealed in the tube. The platinum wires connect with the relay and this, in turn, communicates with the sounder mentioned above.

Estimation of formic acid in foods, H. FINCKE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 1, pp. 1–15; abs. in Analyst, 36 (1911), No. 420, pp. 103, 104*).—The Auerbach and Plüddemann method,[a] which utilizes mercuric chlorid for estimating the formic acid, was investigated by the author, who describes procedures for removing the substances, which, when present, interfere with the accuracy of the method. He finds it convenient where numerous estimations are to be made to use the volumetric method, first neutralizing the formic acid solution, then heating it for 2 hours on the boiling water bath with a known quantity of standard mercuric chlorid solution (58.87 gm. of mercuric chlorid and 15 gm. of sodium chlorid per liter), and titrating the excess of mercuric chlorid with potassium iodid solution.

For occasional determinations the gravimetric method may be employed, thereby avoiding the preparation of standard solutions. In this case the formic acid solution is boiled with sodium acetate and an excess of mercuric chlorid under a reflux condenser. The precipitate of mercurous chlorid is weighed after having been successively washed with warm water, alcohol, and ether, and dried at 100° C. For foods it is necessary to acidify the sample with tartaric acid and to distill with steam until a distillate of at least 1,500 cc. has been obtained. Mineral acids are not recommended, as they caramelize the foods and volatile products are given off which reduce the mercuric chlorid.

When acetaldehyde or formaldehyde is present it becomes necessary to interpose a flask containing water and calcium carbonate between the distilling flask and the condenser, the flask being heated during the operation. The formic acid is retained in the flask containing the calcium carbonate, and the calcium carbonate is filtered off and the acid determined in the filtrate.

When sulphurous acid is present the filtrate from the calcium carbonate flask, or the distillate itself, is neutralized and concentrated to a bulk of 100 cc. The solution thus obtained is treated with sodium hydroxid and peroxid, and after standing for 4 hours the excess of peroxid is removed by freshly precipitated mercuric oxid and sodium acetate. After standing for 30 minutes the formic acid is estimated in the filtrate. Salicylic acid yields an insoluble precipitate with mercuric chlorid and sodium acetate, but this precipitation can be prevented by having some sodium chlorid present.

The relation of the nitrogenous constituents in milk and cream, H. HÖFT (*Arb. Vers. Stat. Molkw. Kiel, 1909, No. 6, pp. 7–11*).—The author points out that the unexplained nitrogen residue which remains in milk after all other constituents are determined is also present in cream. In this work where the total solids, fat, total nitrogen, casein nitrogen, soluble nitrogen, and nitrogen precipitated by tannic acid were determined it was noted that the ratio of fat-free dry substance and nitrogenous bodies to nonfat (plasma) is practically the same in cream and milk.

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[a] Arb. K. Gsndtsamt, 30 (1909), pp. 178–194.

Investigations in regard to milk serum, A. Burr, F. M. Berberich, and F. Lauterwald (*Arb. Vers. Stat. Molkw. Kiel, 1909, No. 6, pp. 26–76*).—Of the sera obtained by coagulating milk spontaneously at incubator and room temperatures and with rennet or acetic acid, the acetic-acid serum had the highest specific gravity, while the lowest value was obtained with rennet. Acetic-acid sera also contained the most fat.

It was also concluded that the specific gravity of the serum from fresh mixed milk never falls below 1.026, and that the refraction of spontaneous sera from pure milk never falls below 8 scale divisions of the Wollny refractometer. The spontaneous sera obtained from pasteurized milk were somewhat lower in gravity than those obtained from raw milk, while the specific gravities of sera from buttermilk and cream were found not to be wholly independent of the method of souring the cream and producing the butter.

In judging strongly decomposed milks, the best criterion, according to the authors, is the ash content of the spontaneous serum. They recommend that in addition to determining the fat according to Wollny, when suspicious samples are at hand to note the refraction of the blue solution.

In regard to the phosphorus in the ash of milk, Bordas and Touplain (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 13, pp. 899, 900*).—The authors determined the total ash, the ash in the serum (obtained by coagulating the milk with trichloracetic acid), and the ash in the resulting coagulum (casein-butter). The inorganic phosphoric acid, which they believe to be confined to the serum, was determined in the dry substance by calcination, while the organic phosphorus which, according to the authors, is in the coagulum was determined by oxidizing with nitric acid and potassium permanganate according to Marie's method. A liter of milk was found to contain total phosphoric acid (P_2O_5) 1.663 gm., inorganic phosphorus 1.279 gm., and phosphorus in the coagulum 0.319 gm.

In regard to the titration of milk fluids, F. M. Berberich (*Arb. Vers. Stat. Molkw. Kiel, 1909, No. 6, pp. 86–102*).—The author sought to verify and investigate the conclusions of others in regard to the irregular results obtained when determining the acidity of milk, etc., in diluted solutions by titration. He found that by adding potassium oxalate to fresh milk a depression in the acidity content took place, and in order to determine which body in the milk was responsible for the depression he tested solutions of phosphoric acid, citric acid, and lactic acid, in combination with calcium salts, magnesium, and potassium, and in the same proportions as they might exist in milk.

No connection between these bodies and the depression could be noted, nor could any relation between the protein substances be determined. According to the author, all irregularities caused by dilution, etc., can be overcome by the addition of 5 cc. of a 30 per cent solution of neutral potassium oxalate to 50 gm. of milk. With it the end reaction with phenolphthalein is also more distinct.

Determination of fat in cream with Wollny's refractometer, A. Burr and F. M. Berberich (*Arb. Vers. Stat. Molkw. Kiel, 1909, No. 6, pp. 84, 85*).—Wollny's refractometer when utilized for cream diluted with water does not yield accurate results. When the cream is diluted with skim milk, however, the refractometer gives figures which correspond more closely to those obtained by the Rose-Gottlieb method.

In regard to the acidity of cream and the buttermilk therefrom, F. M. Berberich and A. Burr (*Arb. Vers. Stat. Molkw. Kiel, 1909, No. 6, pp. 77–83*).—After discussing the various advantages to be derived from determining the acidity during the process of cream ripening, the authors, as a result of making numerous acidity tests, show that a relation exists between the acidity of the ripened cream and that of the resulting buttermilk, the acidity of the latter being the greater. They further note that the acidity in the buttermilk (butter serum) obtained from the butter by kneading it is greater than that in the ordinary buttermilk, the cream, and the water-free cream. They believe that either certain bodies are present in butter which have a great affinity for acid or that the butter fat contributes in some way to the acidity figure. The last supposition seemed the more probable.

A study of the chemical composition of butter fat and its relation to the composition of butter, O. F. Hunziker and G. Spitzer (*Reprint from Proc. Ind. Acad. Sci., 1909, pp. 15*).—The authors agree with Bell that butter fat consists of a mixture of glycerids in which the glycerol is in combination with three different acids, since the glycerol forms tri- and not mono- compounds. If mono-acid compounds were present, the fat would contain tributyrin, which is soluble in 95 per cent ethyl alcohol. In butter, however, only 1.1 per cent is soluble at 20° C., and 3.3 per cent at 75° C.

The constants found for that portion soluble in cold alcohol (20°) were Reichert-Meissl number 48.1, melting point 16.9°, and soluble acids (as butyric) 9.79 per cent; the portion soluble in hot alcohol (75°) had a Reichert-Meissl number of 29.6, melting point 39.5°, and soluble acids 6.6 per cent. In contrast to these, for the portion not soluble in either hot or cold alcohol, the constants were Reichert-Meissl number 20.7, melting point 36°, and soluble acids 4.26 per cent. The saponification equivalent of the portion soluble in alcohol was 216.5, which is equivalent to a molecular weight of 649.5, and the portion insoluble in alcohol had a saponification equivalent of 260.9 and a molecular weight of 782.7. The molecular weight of butyrin is 302. From these results it is evident that tributyrin is not present in butter fat.

From an examination of the hard and soft portions of butter fat fractionated according to Richmond's method, it is concluded that the soft portion contains more volatile or soluble acids and more oleic acid in combination with the glycerol than the hard portion. The melting points of the hard and soft portions were 38 and 13.2°, respectively, as compared with that of 32.5° for the original fat. The difference between the melting point of the insoluble fatty acids of the hard and soft parts was not so great as that of the hard and soft portions of the glycerids from which the acids were derived. The soft portion of the glycerids, however, contained a higher percentage of acid, with a lower melting point. "The iodin number of the soft and hard portions of the insoluble acids is higher than that of the corresponding portions of the glycerids of the butter fat."

In regard to the soluble fatty acids, it was found that in both the hard and soft portions they are in combination with practically the same amount of glycerin. "The percentage of glycerin combined with the insoluble acids is nearly the same in both soft and hard portions, as the percentage of insoluble acids in the soft and hard portions differs very little. Also the variation in the composition of the insoluble acids would not materially affect the molecular weight. Therefore, it is reasonable to expect that nearly the same percentage of glycerin is combined with the insoluble acids of both the soft and the hard portions."

The composition of the butter fat was found to vary with the season of the year and the period of lactation of the animal from which the fat was obtained. "The soluble fatty acids are highest immediately after parturition, or at the beginning of the period of lactation. Slight irregularities excepted, they decreased as the period of lactation advanced and were lowest toward the close of the period of lactation."

Churning tests (12 in number) were conducted in March and May. "In the March butter the percentage increase of the moisture of the soft fats over that of the hard fats was 77.02. In the May butter the percentage increase of the moisture of the soft fats over that of the hard fats was 104.28. These [results] show that the soft fats are capable of taking up a great deal more moisture than the hard fats, [and that] the moisture content of butter made in early summer is due to the increase in the soft fats it contains.

"The moisture-retaining property of the fats is largely dependent on their melting point. The lower the melting point, the greater is their power to mix with and retain water. Since the glycerids of the oleic and soluble fatty acids have a low melting point, it is reasonable [to assume] any increase in the percentage of these glycerids tends to increase the water-retaining properties of butter."

The use of metallic containers for edible fats and oils, J. A. EMERY (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 265–282*).—This investigation, which was carried on with vessels and sheets of tin plate, galvanized iron, copper, tin, lead, zinc, aluminum, and iron, was for the purpose of determining the action of fats and oils upon metals, with particular reference to the utility of these metals as containers.

The work shows that where an increase in the acid content of the fat or oil was noted there was an increase in the solvent action of the oil for metals, particularly where other favorable conditions, such as heat, moisture, and exposure to the atmosphere, were present. With cotton-seed oil, however, an exception was noted, as this oil, when compared with a corn oil of lesser or approximately the same acidity, showed little or no effect upon metals.

"It [was] demonstrated that zinc, copper, and lead are somewhat readily acted upon, while aluminum, iron, and tin, in the order in which they are named, have offered evidences of higher resisting power and are the metals which would more satisfactorily meet the requirements of both manufacturer and consumer."

Chemistry of fumigation with hydrocyanic-acid gas, C. C. McDONNELL (*U. S. Dept. Agr., Bur. Ent. Bul. 90, pt. 3, pp. 91–105, fig. 1*).—This work considers the chemical problems involved in the liberation of hydrocyanic acid from cyanids, and lays special stress upon the action of mineral acids on cyanids and hydrocyanic acid with particular relation to fumigation.

The residue from the sodium cyanid was found to retain less hydrocyanic acid than the potassium cyanid. A formula recommended as practical for field fumigation work is 3 parts sodium cyanid, 4 parts acid, and 6 parts water, the sodium cyanid being expressed in ounces avoirdupois and the acid and water in fluid ounces.

The author points out that all mineral acids cause more or less decomposition of hydrocyanic acid, but that in the amounts in which sulphuric acid is used for fumigation work the loss from this source may be overlooked. As commercial sodium and potassium cyanids contain considerable amounts of sodium chlorid, the author made some tests with mixtures of pure sodium cyanid with from 9 to 66.66 per cent of sodium chlorid. The amount of hydrocyanic acid decomposed varied from 9.62 to 92.09 per cent, and the amount retained in the residue was from 1.4 to 0.63 per cent. One of the principal decomposition products was ammonia, the greater part of which was held in solution in the generator as ammonium sulphate. Nitrates also were found to exert a decided decomposing action on hydrocyanic acid, but the amount was much less than that produced by chlorids. In view of the important bearing of the sodium chlorid content, an analysis of a cyanid is regarded as of little value in fumigation work unless the chlorin content is also determined.

METEOROLOGY—WATER.

Frost data of the United States, and length of the crop-growing season, P. C. DAY (*U. S. Dept. Agr., Weather Bur. Bul. V, pp. 5, charts 5*).—Data from observations made in the open country at approximately 1,000 of the cooperative stations of the Weather Bureau having the longest record, usually from about 10 to 30 years, are summarized in a series of charts showing (1) the average date of the last killing frost in spring, (2) the average date of the first killing frost in autumn, (3) the latest date on which a killing frost has occurred in spring, (4) the earliest date on which a killing frost has occurred in autumn, and (5) the average length of the crop-growing season; that is, the number of days between the average date of the last killing frost in spring and the average date of the first killing frost in autumn.

The importance of frost statistics is pointed out and the influence of special conditions on frost formation as indicated by these charts is discussed.

"In the elevated mountain districts and on some of the higher plateaus of the western country freezing temperatures are liable to occur in all months of the summer, but their effect on vegetation is not so pronounced as in the districts east of the mountains.

"Cool nights are a feature of all arid regions, due to the intense radiation made possible by the generally clear skies and the lack of moisture in the atmosphere. As a result of these conditions the temperature in the early morning hours may frequently reach the freezing point but its continuance may not be for a length of time sufficient to injure the plant structure; in fact, owing to the dryness of the air, frost does not always form with a temperature of 32° or even several degrees lower, and in addition plant life subjected to such variations in temperature becomes more hardy and lower temperatures are required to cause serious injury. On the other hand, in the more humid regions the radiation at night is less rapid, the nights as a rule are not so markedly cold, plant life is less hardy, frost forms readily at the freezing point, the same degree of cold is often protracted over much longer periods of time, and vegetation is therefore more seriously affected.

"Throughout the entire mountain and plateau regions there are protected valleys and slopes where the influence of topography on air drainage is sufficient to considerably modify the effect of latitude in the distribution of temperature, and plants and fruits native to localities much farther south may be grown with little fear of injury from frost. There are also localities where on account of the drainage of air from high, snow-covered mountains frosts are more liable to occur than in other localities in the same latitude not so exposed.

"Consideration of these points is essential to the successful locating of sites for orchards and gardens in all hilly and mountainous regions, it being possible to find belts on the sides of mountains or high hills where plant growth begins several weeks earlier in the spring than at the tops of the hills or in the valleys below; and likewise in autumn frosts are delayed to the same extent, thus lengthening the crop-growing season in these belts several weeks.

"The influence of large bodies of water also in tempering the severity of frosts is clearly brought out in these charts, particular attention being invited to the territory surrounding the Great Lakes where at near-by points the length of the frostless season may differ by from 25 to 50 days. Also along the Atlantic coast in southern New England, over Long Island, and in the vicinity of Chesapeake Bay the growing season is as long as in Tennessee, hundreds of miles to the southward.

"Likewise may be seen the increased probability of frost and the consequent shortening of the growing season on the elevated level plateaus, notably in the Berkshire Hills of New England, over the plateau of western New York and north-central Pennsylvania, in the Cumberland Plateau, and in the highlands of Wisconsin and northern Michigan."

Meteorological record (*New Hampshire Sta. Bul. 151, pp. 49–72*).—Summaries are given of daily observations at Durham, N. H., on temperature, precipitation, direction of the wind, and cloudiness for each month from July, 1908, to June, 1910, inclusive.

Division of meteorology, N. HELME (*Rhode Island Sta. Rpt. 1910, pp. 366–383*).—Daily observations at Kingston on temperature, precipitation, wind, and cloudiness for each month of the year ended June 30, 1910, are summarized in tables and notes. The mean annual temperature was 48.6° F.; the maximum 93°, August 8, 1909; the minimum —7°, January 5 and February 7, 1910. The annual precipitation was 43.71 in., the number of clear days 158, and the prevailing direction of the wind west. The year was characterized by very dry weather in July and August, 1909. The last frost was observed June 5, 1910.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 3 (1911), pt. 5, pp. 275–346, figs. 36, charts 6*).—This number contains the following articles: On the Relation Between Atmospheric Pressure and Wind (illus.), by J. W. Sandström; and Free Air Data at Mount Weather for October, November, and December, 1910 (illus.), by W. R. Blair.

Meteorology, practical and applied, J. W. MOORE (*London, 1910, 2. rev. and enl. ed., pp. 492; rev. in Lancet [London], 1910, II, No. 26, pp. 1837, 1838*).—This is a second revised and enlarged edition of this well-known treatise, which in its new form is thoroughly up-to-date.

The South's rainfall and temperature in relation to southern agricultural monopolies, W. A. WITHERS (*Tradesman, 65 (1911), No. 11, pp. 44, 45*).—The relation of rainfall and temperature to the production of cotton, tobacco, rice, sweet potatoes, sugar cane, and peanuts in the South is discussed. It is shown that conditions of rainfall and temperature are especially favorable to the production of these crops in different parts of the South.

The climate of Hungary, S. RÓNA (*Met. Ztschr., 28 (1911), Nos. 1, pp. 16–28; 2, pp. 53–66*).—This is a summary of a large work in two volumes on this subject published in the Hungarian language.

Underground water papers, 1910 (*U. S. Geol. Survey, Water-Supply Paper No. 258, pp. 123, pls. 2, figs. 32*).—This paper contains a series of short articles reporting the results of special or subordinate investigations as follows:

Drainage by wells, M. L. Fuller (pp. 6–22).—The emptying of sewage and industrial wastes into drainage wells is condemned, but the drainage of most ponds and swamps into wells is considered unobjectionable.

The freezing of wells and related phenomena, M. L. Fuller (pp. 23–31).—It is shown that the freezing of wells is due to access of air to the pipe at considerable depths and not to transmission of cold outside air through the casing, and that methods of protection which do not recognize this fact fail.

Occurrence and composition of well waters in the slates of Maine, F. G. Clapp (pp. 32–39).—Investigations reported show that plenty of excellent water can be found in most of the metamorphic slates of Maine, generally at depths of from 200 to 300 ft. The deeper wells are safer from pollution.

Occurrence and composition of well waters in the granites of New England, F. G. Clapp (pp. 40–47).—Most of the wells drilled in granite in New England yield enough water of good quality for the domestic needs of a family.

Pollution of underground waters in limestone, G. C. Matson (pp. 48–56).—The putting of sewage or filth of any kind in limestone sinks is condemned as likely to pollute underground water channels for long distances from the source of contamination.

Protection of shallow wells in sandy deposits, M. L. Fuller (pp. 57–65).—It is shown that pure water is sometimes obtained from shallow wells in polluted sands. This is explained as due to the fact that "the alternation of layers of materials of different texture, even if all are pervious, and the presence of stratification planes in uniform materials tend to obstruct the downward passage of water and to confine pollution to the upper portion of the ground-water body—the part immediately below the water table."

Saline artesian waters of the Atlantic coastal plain, S. Sanford (pp. 75–86).—Areas, usually in low ground and near large bodies of salt water, where salt water may be obtained, are more numerous than has been supposed. "There is no foundation for the opinion that fresh water can always be found below salt or can be found in a particular formation where salt water has been found in an overlying formation."

There are also papers on Composition of Mineral Springs in Maine (pp. 66–74), and Underground Waters near Manassas, Va. (pp. 94–97), by F. G. Clapp; Magnetic Well, by M. L. Fuller (pp. 87–93); and Utilization of the Underflow near St Francis, Kans., by H. C. Wolff (pp. 98–119).

The quantities of chlorin and sulphur carried into the soil by atmospheric precipitation, IA. VITYN (*Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *12* (*1911*), *No. 1, pp. 20–32*).—From results of analyses of atmospheric precipitation collected at 8 different places in Russia and of drainage waters from lysimeters filled with sandy soil the following conclusions are drawn:

The atmospheric precipitation carried considerably more chlorin and sulphur into the soil than was contained in relatively high yields of grain and straw. The principal source of chlorin was sea water, from which it was carried in the form of sodium chlorid. The principal source of sulphuric acid was sulphurous acid, a product formed from burning wood and coal, as was borne out by the fact that soils of regions where forest industries and coal mines were most numerous showed the highest sulphuric acid content.

For the St. Petersburg district the highest quantities of chlorin were precipitated in the spring and fall, this being associated with the prevailing west sea winds. The sulphuric acid content was highest for the St. Petersburg and Mariupol districts in winter, the time when much wood and coal was burned in the homes, and when the factories increased their activity.

Increased precipitation for brief periods of time decreased the chlorin and sulphuric acid contents of the precipitation. The lysimeter water for a given length of time contained somewhat higher quantities of chlorin and sulphuric acid than were precipitated.

Home waterworks—a manual of water supply in country homes, C. J. LYNDE (*New York, 1911, pp. XII+270, figs. 106*).—In this handbook, which the author considers suitable for reading and study by children in continuation classes and in high schools, the general questions of water supply are considered and also problems of bringing water into the house, methods of pumping, plumbing and sewage disposal, water power, and related matters.

An analytical and epidemiological study of farm water supplies, K. F. KELLERMAN and H. A. WHITTAKER (*Amer. Jour. Pub. Hyg.*, *20* (*1910*), *No. 3, pp. 654–657*).—Previously noted from another source (E. S. R., 22, p. 16).

SOILS—FERTILIZERS.

Organic phosphoric acid of the soil, G. S. FRAPS (*Texas Sta. Bul. 136, pp. 33*).—The author determined the amount of phosphorus soluble in 4 per cent ammonia, and fifth and 1.8-normal nitric acid, in a number of Texas soils before and after ignition. The extraction was made with ammonia directly and after previous extraction with 1 per cent hydrochloric acid, as in the official method. Stewart's ignition method (E. S. R., 23, p. 423) was used, which is in brief as follows:

"A portion of the soil is ignited, extracted with cold 12 per cent hydrochloric acid, and the phosphoric acid estimated. From this is subtracted the amount of phosphoric acid extracted from the original soil by the same process, and the result is taken to represent the organic phosphorus. The method is based upon the tacit assumption that the effect of the ignition is to destroy the organic phosphorus compounds and so render the phosphorus soluble in acids, without affecting the solubility of the inorganic phosphates."

The conclusions drawn from this work are as follows:

"Phosphoric acid is present in the soil as organic phosphates, as phosphates of lime, and as phosphates of iron and alumina.

"The ammonia-soluble phosphoric acid is partly inorganic and partly organic.

"Ammonia dissolves phosphoric acid chiefly from phosphates of iron and alumina.

"Some soils may fix phosphoric acid from ammonia solution.

"The concentration of the phosphoric acid in ammonia or fifth-normal nitric acid increased with the quantity of soil present, but the parts per million of phosphoric acid extracted from the soil decreased as the quantity of soil was increased. This behavior of the soil phosphates toward ammonia is not in accord with the theory that the ammonia merely combines with organic compounds containing phosphorus.

"The quantities of iron and alumina, lime and magnesia dissolved by the ammonia were small.

"Phosphoric acid fixed by the soil was partly extracted by acid, partly extracted by ammonia, and a portion remained in the soil.

"Organic matter added to the soil increases the ammonia-soluble phosphoric acid. As the organic matter decays, the ammonia-soluble phosphoric acid usually decreases, though sometimes it increases.

"An increase in ammonia-soluble phosphoric acid during decay does not necessarily mean an increase in organic phosphoric acid.

"Phosphoric acid is dissolved by ammonia from ignited soils. This is evidence that the ammonia-soluble phosphoric acid is partly of inorganic origin.

"More phosphoric acid was dissolved from ignited soils by ammonia, after extraction with acid, than from the same soils before extraction. The increase in ammonia-soluble phosphoric acid brought about by the action of acid on the soil is thus not necessarily entirely due to the liberation of organic compounds containing phosphoric acid, which are dissolved by ammonia.

"Ammonia has a greater solvent action upon some mineral phosphates (wavellite) than has 1 per cent hydrochloric acid.

"Twelve per cent hydrochloric acid does not extract all the phosphoric acid of wavellite, variscite, or dufrenite.

"Ammonia extracts more phosphoric acid from wavellite than does 12 per cent hydrochloric acid.

"An extraction with ammonia following an extraction of the soil with 12 per cent hydrochloric acid may dissolve more inorganic phosphoric acid than a second extraction with 12 per cent acid.

"Ignition has a marked effect on the solubility of phosphates in acids. Wavellite, dufrenite, and variscite become almost completely soluble.

"About ten times as much phosphoric acid was dissolved by fifth-normal nitric acid from the ignited minerals tested, as from the nonignited.

"Ignition increases the solubility in 12 per cent hydrochloric acid of the iron oxid and alumina in the soil, sometimes to a very great extent.

"Increase in the phosphoric acid dissolved by hydrochloric acid caused by ignition is no evidence that such phosphoric acid is in organic combination.

"The method of ignition and solution can not be used as a method for estimating the organic-phosphoric acid of the soil.

"From 12 to 100 per cent of the ammonia-soluble phosphoric acid of the soil (average 51 per cent) was present in the ignited soils.

"There was no definite relation between ammonia-soluble and ignition-soluble phosphoric acid in the soils tested.

"The ignition-soluble and the ammonia-soluble phosphoric acid do not represent the same thing.

"A high content of ignition-soluble phosphoric acid was associated with a relatively high content of nitrogen and of oxids of iron and alumina in the soils examined. A high content of nitrogen was not, however, always accompanied with a high content of ignition-soluble phosphoric acid.

"When the soils were grouped according to their content of ignition-soluble phosphoric acid, the average nitrogen content increased with the average ignition-soluble phosphoric acid, though not regularly. The average content of iron oxid and alumina also increased.

"We have at present no method for estimating the organic phosphoric acid of the soil."

Character and leaching of podzol soils, G. Tumin (*Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *12* (*1911*), *No. 1, pp. 1–19*).—It is stated that the character of the podzol soil does not depend upon leaching. Three types of podzol soils are distinguished. The real podzol consists of a gray surface layer, underlain with a white sole, beneath which occurs a white mottled grayish brown soil. In a less characteristic podzol the white layer tends to merge into the gray surface soil, and in a slightly characteristic podzol there is no white layer. These variations in the color of the soil, as well as the leaching properties, are dependent upon the humus content, the white layer of soil marking the depth to which decomposition of the organic matter takes place.

On the relation of clay soils to water, the limits and degrees of their plasticity, A. Atterberg (*K. Landtbr. Akad. Handl. och Tidskr.*, *50* (*1911*), *No. 2, pp. 132–158, figs. 3*).—The author gives a classification of clay soils and reviews the various methods for the determination of their degree of plasticity. The methods of examination worked out by him are given in detail in the paper. See also a previous note (E. S. R., 25, p. 116).

The soil, a living thing, J. W. Harshberger (*Science, n. ser.*, *33* (*1911*), *No. 854, pp. 741–744*).—In this article the author, like Berthelot, conceives of the soil as a living thing apart from its chemical and physical structure and suggests "that in the reaction between the living soil and the growing plant is the true explanation of soil fertility. A fertile soil is a live one. An infertile soil is a dead one. Contrast the soil which is filled with organic matter (humus) and in which numberless fungus, bacterial, and protozoan organisms are at work with a mass of clay or sand without such organic material and associated living organisms. The one soil is fertile, because the organisms in the soil react favorably upon each other, the other soil is infertile, because the organisms present in this soil are antagonistic."

Recent investigations bearing upon the interrelation and interdependence of plants and soil organisms are reviewed as indicating "the way along which future research on soils must proceed."

Enzymatic activities in soils, O. SCHREINER and M. X. SULLIVAN (*Abs. in Science, n. ser., 33 (1911), No. 844, p. 339*).—The author points out that amylolytic, proteolytic, cytolytic, lipolytic, and inverting enzyms exist in the soil. "The oxidizing and catalytic activities of the soil, comparable to the same activities in plants and animals where it has been attributed to enzyms, are especially noticeable and easy of demonstration. As yet no satisfactory means have been obtained of extracting enzyms from soil to any great extent, though in soils recently cropped there is some slight evidence of the presence of enzym-like substances in the glycerin extract of the soil."

Two compounds isolated from peat soils, C. S. ROBINSON (*Jour. Amer. Chem. Soc., 33 (1911), No. 4, pp. 564-568*).—The author isolated leucin and isoleucin from a sample of common brown peat. A sample of black peat was also examined, but the material obtained was too small to permit a separation of the isomers.

The isolation of creatinin from soils, E. C. SHOREY (*Abs. in Science, n. ser., 33 (1911), No. 844, p. 340*).—Creatinin was isolated from various soils. The method used is described in detail.

Productivity of soils, F. H. KING (*Science, n. ser., 33 (1911), No. 851, pp. 614-619*).—This is a review of a paper by Chamberlin on the secular maintenance of soils (E. S. R., 24, p. 709), in which exception is taken to certain of the conclusions drawn in that paper, particularly those relating to the maintenance of the supply of potash and phosphoric acid in the surface soil as a result of the so-called capillary and plant cycles.

Examination of soil samples (*U. S. Dept. Agr., Bur. Soils Circ. 26, pp. 7*).—This circular outlines the procedure of the Bureau of Soils in examinations of soil samples submitted by correspondents, discusses different factors which must be taken into consideration in judging of the character and adaptation of soils, and specifies the information that should accompany soil samples sent to the Bureau for examination.

Soils of the Eastern United States and their use.—III, The Portsmouth sandy loam, J. A. BONSTEEL (*U. S. Dept. Agr., Bur. Soils Circ. 24, pp. 12*).—This, the third of this series of circulars, deals with the Portsmouth sandy loam, of which a total area of 774,052 acres in 21 different areas in 9 States has been surveyed by the Bureau of Soils.

Soils of the Eastern United States and their use.—IV, The Sassafras silt loam, J. A. BONSTEEL (*U. S. Dept. Agr., Bur. Soils Circ. 25, pp. 14*).—This, the fourth of this series of circulars, deals with the Sassafras silt loam, of which a total area of 518,142 acres in four different States has been surveyed by the Bureau of Soils.

[Soils of the Hawaiian Islands], E. V. WILCOX (*Hawaii Sta. Rpt. 1910, pp. 11, 12*).—"The soils of the Hawaiian Islands are very different in several respects from those which are familiar to farmers and agricultural workers on the mainland. In the first place, the Hawaiian soils contain high percentages of iron in various forms (say from 15 to 30 per cent). In addition to the high iron content, the soils contain more titanium than mainland soils, and in some localities also a large amount (up to 9 per cent) of manganese. The presence of the large quantity of iron in Hawaiian soils gives them physical properties which are seldom met with in soils on the mainland. Wherever special attention is not given to cultivation, the soils rapidly become impervious to water and air, and the iron present in the soil is reduced to the ferrous state. This, as is well known, is injurious to plant growth and is instrumental in preventing adequate aeration of the soil. Moreover, when the iron exists in the ferrous state, and the soil can not be aerated, the use of fertilizers gives little or no benefit. It is therefore necessary to adopt a rational soil program with the central idea, that of securing a better aeration and better physical properties of the soil. Studies, which are designed to throw light on the practical methods of accomplishing such a result, are now in progress at the station, and the suggestions, already made by the station chemist, are being put into practice in a number of localities. It may be truthfully said that in many localities the chief soil problems are concerned with the physical rather than the chemical properties of the soil. Improper aeration not only causes the iron to become reduced to the ferrous state, but may also prevent the utilization by the plant of the plant food naturally present in the soils."

The Hawaii Station is studying, by means of pot and field experiments, cultural and rotation methods for securing better aeration of the soil.

Deli soils, J. G. C. VRIENS and S. TIJMSTRA (*Meded. Deli-Proefstat. Medan, 5 (1911), Nos. 6, pp. 145–167; 8, pp. 259–295, map 1*).—In this article, which reports a continuation of investigations (E. S. R., 24, p. 713), results of studies on the relation of various physical soil factors to each other and to the chemical constituents of the soil are reported. Among the more important conclusions reached are the following:

The nitrogen-fixing power and the water-holding capacity varied with the fineness of the soil, being highest from the finest soils. A high nitrogen-fixing power was associated with a high water capacity, a low absorptive capacity, and a low porosity, whereas a low nitrogen-fixing power indicated a low water capacity. A high nitrogen content was associated with a high water capacity and a low absorptive capacity, whereas a low nitrogen content indicated a low water capacity and high porosity. A medium to high phosphoric acid content was associated with a high water capacity and a low volume weight; a good phosphoric acid content went with a high absorptive capacity and a high porosity. A high potash content went with a low retentive power with a decrease in volume, whereas a low potash content indicated a high water capacity, a medium retentive power with increase in volume, a low volume weight, high absorptive capacity, and high porosity. A high lime content went with a high nitrogen-fixing power and a high water capacity. No definite relation between lime content and absorptive capacity, volume weight, and porosity could be established.

Deli soils, J. G. C. VRIENS (*Meded. Deli-Proefstat. Medan, 4 (1910), No. 6, pp. 177–180; 5 (1911), No. 8, pp. 255–257*).—This is a continuation of the report on the analyses of tobacco soils previously noted (E. S. R., 23, p. 224).

Methods and results of ten years' soil investigations in Illinois, C. G. HOPKINS (*Illinois Sta. Circ. 149, pp. 12–32, figs. 5*).—This is an address delivered before the Illinois State Farmers' Institute in February, 1911, and gives an account of the plan, purpose, and progress in three lines of soil investigation carried on by the Illinois Experiment Station, (1) soil surveys, (2) soil analyses, and (3) culture experiments.

A list of firms from which natural rock phosphate, bone meal, potash salts, and ground limestone may be obtained is added.

Results of scientific soil treatment, F. I. MANN (*Illinois Sta. Circ. 149, pp. 3–11, figs. 5*).—This is an address delivered before the Illinois State Farmers' Institute in February, 1911, and deals with the method of soil improvement, namely, use of raw phosphate in a rotation of cereals and leguminous plants, recommended by the Illinois Experiment Station.

The natural plant food content and fertilizer requirements of soils, F. LEDIEN (*Gartenflora, 60 (1911), Nos. 2, pp. 25, 26; 5, pp. 94–106*).—This is a brief popular summary of the more recent investigations on this subject with special reference to horticultural crops.

Debated fertilizer questions, SCHNEIDEWIND (*Ztschr. Angew. Chem., 23 (1910), No. 12, pp. 567, 568*).—The questions briefly discussed in this article are soil robbery, sodium nitrate versus ammonium sulphate as a fertilizer, the most efficient forms of phosphoric acid and potash, and the lime-magnesia ratio in soils.

The purchase and home mixing of fertilizers, F. W. TAYLOR (*New Hampshire Sta. Circ. 12, pp. 2–12*).—This circular explains how to interpret a fertilizer guaranty and the advantages of high-grade as compared with low-grade fertilizers and of home mixing of fertilizers, and gives directions for home mixing with formulas for different crops.

On the value of peat litter, J. J. TYLVAD (*Hedeselsk. Tidsskr., 1911, No. 7, pp. 74–83*).—A description is given of the method of manufacture and of Danish experiments with peat litter as an absorbent for liquid manure. It is shown that losses of nitrogen in liquid manure can be entirely avoided by the use of sufficient quantities of peat litter as an absorbent.

A new ammonia salt (*Saaten, Dünger u. Futtermarkt, 1911, No. 8, pp. 219, 220; abs. in Jour. Agr. Prat., n. ser., 21 (1911), No. 10, pp. 300, 301; Betterave, 21 (1911), No. 527, pp. 103, 104*).—This article briefly describes a cheap process for preparing a by-product of gas manufacture consisting mainly of ammonium sulphite and sulphate. Experiments are cited in which good results were obtained with this material in comparison with ammonium sulphate in fertilizer experiments on wheat, rye, oats, barley, potatoes, beets, and grass.

Nitrate industry of Chile, H. P. FLETCHER (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 94, pp. 340, 341*).—Statistics furnished by the Nitrate Propaganda are quoted, showing a production of 2,667,000 tons during 1910 as compared with 2,275,559 tons in 1909. The estimated production for 1911 is 2,794,000 tons.

The importance of phonolite as a potash fertilizer, T. PFEIFFER, E. BLANCK, and M. FLÜGEL (*Mitt. Landw. Inst. Breslau, 6 (1911), No. 2, pp 233–272; abs. in Deut. Landw. Presse, 38 (1911), No. 8, pp. 79, 80; Ztschr. Angew. Chem., 24 (1911), No. 17, pp. 804, 805*).—This article reviews other investigations on the fertilizing value of potassium silicate and reports pot and field experiments, comparing phonolite with potash salts on various crops. Incidentally tests were also made of humus-silicic acid. The results agree in showing a certain fertilizing value for this material, although it was much less effective than the potash salts. No beneficial effect resulted from the use of the humus-silicic acid.

Various experiments with raw phosphates, D. N. PRIANISHNIKOV ET AL. (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou), 17 (1911), No. 1, pp. 1–141, figs. 16*).—This article reports trials of various methods of preparing superphosphates from different kinds of Russian phosphates as well as tests of the raw phosphates on different crops in sand cultures.

Experiments with bone meal, D. N. PRIANISHNIKOV ET AL. (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou), 17 (1911), No. 1, pp. 142–176, figs. 8*).—The experiments here reported indicate that bone meal is more sensitive to the conditions under which it is used than superphosphate or Thomas slag. The efficiency of the material as a fertilizer was reduced by the addition of calcium carbonate, and increased by the addition of ammonium salts and by the substitution of nitrogen obtained from the air through leguminous plants for nitrate nitrogen. When nitrate nitrogen was used better results were obtained by applying it separately than with the bone meal. The bone meal gave better results in larger pots more abundantly supplied with moisture than in smaller pots. Better results were obtained by watering from above rather than from below and by late rather than early seeding.

On the sale of Martin slag containing fluorin for Thomas slag, O. LEMMERMANN (*Illus. Landw. Ztg., 30 (1910), No. 91, p. 847*).—It is stated that Martin slag containing 6.31 per cent of phosphoric acid, of which 1.38 per cent was soluble in citric acid solution, and an appreciable amount of fluorin, was found to be on sale as a substitute for Thomas slag.

A few notes on lime for agricultural purposes, B. E. CURRY (*New Hampshire Sta. Circ. 13, pp. 4*).—This circular describes different forms of lime and discusses their relative value for fertilizing purposes, especially under New Hampshire conditions.

The valuation of lime marl, GERLACH (*Deut. Landw. Presse, 38 (1911), No. 35, p. 409*).—Results of pot experiments confirmed the conclusions of Baessler that the solubility of calcium carbonate in lime marls depends upon the percentage of calcium carbonate and the degree of fineness of the crude product. For practical purposes it is recommended that the marl be of such fineness as to allow 90 per cent of it to pass through a ½ mm. sieve.

Fertilizer inspection (*Maine Sta. Off. Insp. 29, pp. 36*).—This reports the results of analyses of fertilizers inspected in Maine during 1910, with explanations regarding the analysis and valuation of fertilizers and comments upon the results of inspection.

Analyses of fertilizers, spring season, 1911, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 32 (1911), Nos. 3, pp. 84; 4, pp. 93*).—Analyses and valuations of fertilizers collected in North Carolina during the spring of 1911 are given, with a list of manufacturers and brands licensed for sale in the State for the season of 1910–11, explanations of terms, and freight rates from the seacoast to inland points.

Analyses of licensed commercial fertilizers, 1911, F. W. WOLL (*Wisconsin Sta. Circ. Inform. 25, pp. 12*).—This circular gives a list of commercial fertilizers licensed for sale in the State during the year, with guaranties of composition and results of analyses of samples furnished by the manufacturers and collected by agents of the station. Brief explanations are also given of the terms used in stating analyses and valuation of fertilizers.

List of fertilizer manufacturers and importers (*Penn. Dept. Agr. Bul. 205, pp. 37*).—This list gives not only names and addresses of the manufacturers and importers, but names of the "brands of their fertilizers for which license to sell in Pennsylvania during 1911 was taken out prior to February 21, 1911."

AGRICULTURAL BOTANY.

Protective enzyms, M. T. COOK ET AL. (*Science, n. ser., 33 (1911), No. 851, pp, 624–629*).—This is a preliminary report of studies made by the authors which show the important relations and reactions carried out by certain protective enzyms of fruits. The work originated in experiments begun to determine the toxicity of tannin. Most of the experiments were carried on with pomaceous fruits, although those of the tomato and other plants were used.

The authors, summarizing their investigations, state "that there exists in the normal living fruit two enzyms, a catalase and an oxidase. The latter is probably most abundant in the early part of the season, gradually decreasing in activity as the fruit approaches maturity and ripens. Furthermore, from the above results it appears that tannin as such does not exist in any part of the normal, uninjured fruit previous to maturity, except possibly a small amount in the peel, but exists as a poly-atomic phenol, which upon injury is acted upon by the oxidase and forms a tannin or tannin-like body having the property of precipitating proteid matter, and at the same time forming a germicidal fluid. This oxidase acts only in an acid solution, and when present in an amount above a certain undetermined minimum. The above conditions are always present in normal immature pomaceous fruits. When normal, immature fruits are subjected to injury by fungi, insects, or mechanical agencies, the action of the oxidase on poly-atomic phenol is brought about with the effects as stated above."

Some properties characteristic of amylose and amylopectin, Mme. Z. GRUZEWSKA (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 12, pp. 785–788*).—A study has been made of potato starch, and by means of a method described the author states that the starch grain can be easily separated into two distinct bodies, amylose and amylopectin. Amylopectin and mineral matter compose the envelope of the starch grain, while amylose is localized in the interior. Amylose, like inulin and some other bodies, has the property, upon becoming old, or under the action of cold, of precipitating from its solutions. This phenomenon has been called retrogradation. Purified amylopectin is not precipitated from its solutions either upon standing or under the influence of cold.

On the formation of anthocyanin, Miss M. WHEDLALE (*Jour. Genetics, 1* (*1911*), *No. 2, pp. 133–158*).—The author has made a study of anthocyanin to determine the chemical processes which underlie its formation.

On summarizing her results it is said that the soluble pigments of flowering plants, collectively termed anthocyanin, are oxidation products of colorless chromogens of an aromatic nature which are present in the living tissues in combination with sugar as glucosids. The formation of the glucosid from chromogen and sugar is in the nature of a reversible enzym action. The chromogen can be oxidized to anthocyanin only after liberation from the glucosid, and the process of oxidation is carried out by one or more oxidizing enzyms. The amount of free chromogen, and hence the quantity of pigment formed at any time, is inversely proportional to the concentration of sugar and directly proportional to the concentration of glucosid in the tissue. The local formation of anthocyanin which is characteristic of the normal plant is due to local variation in concentration of either the free sugars or the glucosids in the tissues in which the pigment appears. The abnormal formation of pigment is attributed to differences in the concentration of these same substances due to changes in metabolism.

The application of the hypothesis relating to anthocyanin to Mendelian factors is discussed.

The absorption of colloidal organic material, P. MAZÉ (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 12, pp. 783–785*).—Studies were made with maize grown in cultures to which starch, peptone, and humus compounds were added in connection with salts of ammonia. The absorption of the colloidal organic matter, as well as its assimilation, was demonstrated. Under the influence of the products of excretion a neutral solution containing humus was acidified, while in another series the solution remained neutral on account of the liberation of soda.

The starch did not present any trace of liquefaction or saccharification, nor did it show the presence of amylase. Preliminary investigations indicated that sucrase in the solutions gave negative results. The roots did not excrete either amylase or sucrase, contrary to common belief. The saccharification of starch and the inversion of saccharose was brought about at length under the influence of the progressive acidification of the nutrient solutions.

The action of some hydrolyzable salts and colloids on plants, A. GRÉGOIRE (*Bul. Soc. Chim. Belg., 25* (*1911*), *No. 2, pp. 85–103*).—In a previous publication (E. S. R., 23, p. 527), the author showed that certain readily hydrolyzable salts had an important effect on the growth of rye. In 1910 he continued his experiments, using barley as a representative of cereals, the ash of which is said to be acid in reaction, and sugar beets, the ash of which is alkaline. The plants were grown in water cultures containing a nutrient solution, to certain series of which were added a number of compounds, as silica, aluminum hydrate, straw gum, calcium laurate, palmitate, humate, carbonate, and zeolite, and sodium zeolite. After about 4 months the plants were analyzed and their ash, dry matter, etc., determined.

As a result of this investigation the previous conclusion is confirmed that certain hydrolyzable salts which do not act as plant nutrients still have a very important rôle in connection with plant growth. Barley and probably all of the Gramineæ do not develop normally except in solutions containing colloidal silicic acid, and they were found to be extremely sensitive to certain organic compounds, especially humic acid. On the contrary, the sugar beet flourishes in the presence of humic acid in the nutrient solution, but suffers considerably in the presence of silicic acid.

In making some deductions from his experiments the author states that the favorable action of ammonium sulphate as compared with nitrate of soda on the Gramineæ may be explained by the fact that the ammonia is physiologically acid and its introduction into the soil probably results in a mobilization of the silicic acid. He also states that manure applied to spring grains has a detrimental effect, due to the formation of calcium humate, which is injurious to grasses.

Combined influence of zinc and manganese on the development of Aspergillus niger, G. BERTRAND and M. JAVILLIER (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 13, pp. 900–902*).—In a previous publication attention is called to the catalytic action of certain substances and their effect on plant growth (E. S. R., 21, p. 723). In a subsequent paper a report is given on the effect of manganese on the development of *A. niger* (E. S. R., 25, p. 127), and in the present article an account is given of the combined action of zinc and manganese used in considerable dilution upon the growth of this fungus.

It was found that when added to cultures containing the fungus the combined influence of zinc and manganese was of decided advantage, not only when used in proportions which previous experiments had shown were the optima for the different compounds used singly, but also when used in less quantity.

The authors claim that the catalytic action which various substances have toward plant cells is of especial economic importance.

The retention of mineral matter by annual plants, and the distribution of the dry matter, total ash, and nitrogen, G. ANDRÉ (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 12, pp. 777–780*).—In a previous paper (E. S. R., 24, p. 721), the author reported the retention of practically all the mineral matter taken up through the roots of annual plants. In the present article the results are given of studies on the distribution of dry matter, ash, and nitrogen in the roots, stems, leaves, and fruits of carnations at various stages of growth.

The dry matter of all parts of the plants constantly increased up to maturity. The total weight of ash increased in all the plant organs except in the leaves, where there was a loss of about 5 per cent between the beginning of maturity and its final completion. The total nitrogen increased in the roots until after flowering, when it decreased slightly, gaining again at maturity. In the leaves the total nitrogen attained its maximum at the period of flowering. In the stems and fruits it increased with practically every succeeding stage of growth. The percentage of nitrogen in comparison with the dry weight diminished constantly through the different periods, although the loss was very slight in the fruits.

The phenomena of phosphoric acid migration are more regular than those described for nitrogen, while potash is said to behave essentially as does nitrogen.

The selective power of plants for dextrose and levulose, L. Lindet (*Bul. Assoc. Chim. Sucr. et Distill., 28 (1911), No. 10, pp. 727–743; abs. in Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 12, pp. 775–777*).—The author found in previous experiments (E. S. R., 12, p. 113) that beet leaves when constantly in contact with dextrose and levulose absorbed dextrose when respiration was active and levulose when growth was rapid. He has recently extended his experiments to include yeasts, aerobic fungi, and embryos of beans and barley.

With the yeast, dextrose was found to induce a much greater zymotic action than did levulose. With the barley and bean embryos, dextrose was taken up from the solution in the proportion of 1.7 to 1 of levulose. For the same amount of each sugar taken up the weight of the plantlets was twice as great for the levulose as for the dextrose. With the fungi, reproduction was increased by levulose, and respiration by dextrose.

All the experiments show, it is claimed, that the absorption of levulose from cultures is attended with the functions of growth, while dextrose is associated with the respiration.

The action of ultraviolet rays on starch, L. Massol (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 13, pp. 902–904*).—According to the author, the exposure of soluble starch, prepared by heating it for a considerable time, to the light of a mercury-quartz lamp so changes the starch that it loses after a while its property of becoming blue when acted upon by iodin. The rapidity of the transformation increases as the concentration decreases and when the medium has become acidified. This transformation, which is interesting from the point of physiological botany, the author claims is due to the photochemic action of the light and not to the influence of the acid, the temperature, or oxygenated water.

Recent investigations on the alleged utilization of atmospheric nitrogen by certain special hairs of plants, F. Kövessi (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 13, pp. 888–890*).—In continuation of a previous communication (E. S. R., 22, p. 230), the author reviews experiments to verify the theory announced by Jamieson (E. S. R., 18, p. 125) and Zemplèn and Roth (E. S. R., 22, p. 521) relating to the acquisition of atmospheric nitrogen by plants through special trichomes. He has made a study of a considerable number of plants, growing them in air and in an atmosphere deprived of nitrogen, and has found nothing to change his previous opinion. On the contrary, it was found that in the two lots of plants the hairs described were developed equally and produced the same reactions when tested with the reagents recommended.

On the "air culture" of green plants, V. Artsikhovskiĭ (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1911), No. 1, pp. 46–53, figs. 6*).—As the root tubercles of leguminous plants develop either very poorly or not at all in water cultures, the author has devised a method of growing the plants in air cultures.

The roots were allowed to develop in a moist chamber composed of an inverted flowerpot with its top plunged into water contained in a plate, and the roots, which were above the water, were sprayed several times a day with a nutrient solution. By such a device the author claims to have successfully grown *Pisum sativum* with an abundant development of root tubercles.

The nuclear conditions in certain short-cycled rusts, E. W. Olive (*Science, n. ser., 33 (1911), No. 840, p. 194*).—The author recognizes 2 general types of the short-cycled lepto rusts and micro rusts with reference to the time of inauguration of the binucleate condition. In one type, illustrated by *Puccinia elegans*, *P. asteris*, and *P. malvacearum*, the binucleate condition arises at the base of the young teleutospore sori. In the other type the binucleate condition arises at some indefinite point earlier in the life history in the vegetative mycelium. *Uromyces rudbeckiæ* was found to present an enigmatical variation in which all cells, teleutospores as well as vegetative mycelium, possessed each but one nucleus.

The theory and practice of plant breeding, H. LANG (*Theorie und Praxis der Pflanzenzüchtung. Stuttgart, 1910, pp. VIII+169, figs. 47*).—This textbook gives practical directions for plant breeding experiments, and describes various aids that have been found of advantage in the manipulations attending plant breeding, selection, and fixation of new forms, after which a discussion is given of heredity, natural selection, correlation, etc. Special chapters are devoted to the problems of breeding wheat, rye, barley, oats, beets, potatoes, maize, red clover, and tobacco.

A rather extensive bibliography of plant breeding is given.

Alterations in heredity induced by ovarial treatments, D. T. MACDOUGAL (*Bot. Gaz., 51* (*1911*), *No. 4, pp. 241–257, pls. 3, figs. 3*).—For a number of years the author has carried on experiments to determine the effect of injecting various solutions into the ovaries of different plants, a preliminary account of which has been given (E. S. R., 19, p. 1127). The present paper gives an account of the progress that has been made, and includes a description of the technique and character of the plants employed, together with the results of the culture of the affected species through a number of generations.

The earlier conclusions that the sum of hereditary characters in pedigreed lines of plants may be altered by solutions applied to the ovaries in the stage immediately preceding fertilization have been confirmed, and some of the derivatives have been carried through several generations.

Experimental studies in Indian cottons, H. M. LEAKE (*Proc. Roy. Soc.* [*London*], *Ser. B, 83* (*1911*), *No. B 566, pp. 447–451*).—The author made a study of the types of cotton most cultivated in India, particularly of those types common to northern India. He states that they fall into two groups, which are characterized by the form of the secondary branches, which may be either monopodial or sympodial. The experiments reported cover observations on color of corolla, red coloring matter of sap, leaf factor, type of branching and length of vegetative period, and glands of the leaf.

From an economic standpoint the author states that it is essential that plants of the sympodial type should be cultivated in the United Provinces of India to be a commercial success, for the monopodial types do not flower in time to give a crop before the winter sets in. The majority of Indian cottons with a valuable staple, it is said, belong to the monopodial type, and the problem for the plant breeder is the isolation of sympodial forms with the staple of the monopodial type.

Studies on the variability and heritability of pigmentation in Œnothera, R. R. GATES (*Ztschr. Induktive Abstam. u. Vererbungslehre, 4* (*1911*), *No. 5, pp. 337–372, pl. 1, figs. 5*).—A summary is given of observations made during the past 4 years on the variation and inheritance of the red pigment, anthocyanin, in Œnothera. The studies concerned the development of the red color pattern, which occurs particularly on the calyx in many forms, but which may also appear in other parts of the plant.

In most cases these quantitative differences in pigmentation were found to be nonheritable, but one striking case is described in which there was found a strict inheritance of an extreme amount of pigmentation. A series of crosses between this mutant and other forms is said to have given some interesting results.

Experiments with Primula sinensis, R. P. Gregory (*Jour. Genetics, 1 (1911), No. 2, pp. 73–132, pls. 3, figs. 2*).—A study has been made of *P. sinensis*, particular attention being paid to heterostylism, leaf shape, habit, double flowers, characters of the eye of the flower, and color. The principal object of the investigation was to determine the inheritance of heterostylism and of color. At the same time records were kept of certain other characters, the inheritance of these for the most part being of a simple type.

A census catalogue of Irish fungi, J. Adams and G. H. Pethybridge (*Proc. Roy. Irish Acad., 28 (1910), No. 4, Sect. B, pp. 120–166, map 1*).—This catalogue includes a compilation of previous lists and of species from other publications on Irish fungi up to 1910. The distribution by counties of each species, an extended bibliography of Irish fungi, a list of synonyms, and an index to the genera are also given.

FIELD CROPS.

On the correction of results obtained in field trials, R. K. Kristensen (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 4, pp. 627–639*).—A discussion of the value of the method of Holtsmark and Larsen for correcting errors in field trials due to lack of uniformity in the soil (E. S. R., 18, p. 436).

The results of electroculture in Hedewigenkoog, Clausen (*Landw. Wchnbl. Schles. Holst., 61 (1911), No. 5, pp. 83–86*).—The results of electrocultural experiments with clover, wheat, and oats are reported. The data obtained do not indicate that the action of the electrical installation had any effect upon the growth of the crops.

Experiments with shelter for agricultural crops, 1910, O. Kristensen (*Ber. Ribe Amts Landbofor. Havebr. og Husmands, 1910, pp. 20, figs. 13*).—These experiments, like those of the preceding year, were conducted by Ribe county agricultural societies (Jutland). Six series of experiments were carried through with shelters of different heights and position, the crops experimented with being rye, oats, barley, rutabagas, clover, and grass.

The experiments with spring grains gave rather indefinite results, but greatly increased yields were obtained in the case of the other crops. The growth of the grasses and clovers was especially benefited by shelter. The increase in yields of hay obtained from the protected plats ranged from 12 to 50 per cent in the different trials.

Fertilizer experiments with garden crops and fruit trees are also reported.

The choice of crops for alkali land, T. H. Kearney (*U. S. Dept. Agr., Farmers' Bul. 446, pp. 32*).—This deals with the nature and appearance of alkali, its effect upon plant growth, and the selection of crops adapted to alkali land and to different grades of alkali. The alkali resistance of different crop plants is also discussed.

Remarks on dry farming, N. M. Tulaikov (*Vi͡estnik Russ. Selsk. Khoz, 1909, No. 42–44; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 4, p. 596*).—The author compares the results of American and Russian dry-farming investigations.

[Work with field crops at the Hawaii Station], E. V. Wilcox, W. P. Kelley, and F. G. Krauss (*Hawaii Sta. Rpt. 1910, pp. 12–14, 43, 44, 51–64, pls. 6*).—In plat and pot experiments it was observed that "nitrate of soda appeared to produce no beneficial effect, while ammonium sulphate was very active in promoting growth and yield of grain." Further experiments are being conducted.

In Hawaii "it has been shown that cotton will thrive under a wide range of rainfall, from 25 to 100 in. per year, and at a considerable variation of altitude, from sea level to 1,600 ft." Because of its upright habit of growth Caravonica cotton has proved superior to sea-island, which fruits so heavily that the branches lie on the ground, causing the bolls to rot. One sea-island plant produced 700 bolls of cotton and one tree 1,200 bolls. Pruning experiments are being conducted to determine whether the sea-island cotton can not be induced to adopt an upright habit of growth, at least during the second and subsequent years of growth. Pure strains have been propagated by means of cotton cuttings, a number of which are about to come into bearing. Propagation by means of budding has proved easy, but its economy on a commercial scale is not yet determined.

In the system of double cropping of rice followed by Chinese growers in the islands, fertilizer is applied only to the spring crop. Work has been taken up to determine the residual effect on the fall crop of this application and whether satisfactory yields may be obtained by the use of fertilizers under continuous cultivation of rice. Some results of fertilizer experiments with rice already noted (E. S. R., 20, pp. 137; 24, p. 635) are reviewed.

Among introductions from China and Japan of 100 of the most distinct types, Benkei, Miyako, Omachi, and Shinriki are described. Omachi and Shinriki excelled the old-type Japan rice, No. 153, in yield of paddy per 100 clumps and bring high market prices, since they find especial favor among the Japanese population of the islands. Some strains of the old type which are being developed are now in the seventh generation. "Increase in yield has been less noticeable than greater purity and uniformity."

Among the new varieties of rice introduced by the station, No. 19 (S. P. I., No. 12508), introduced in 1907, appears to have found favor among intelligent rice growers and is reported as well suited to the salt-marsh lands. It is regarded as desirable to combine the hard, translucent grain and heavy tillering power of this variety with the all-season cropping habits of Gold Seed. The observations made agree with those of Japanese investigators, who find that a natural hybrid among rice varieties is "of rare occurrence, notwithstanding the fact that more than 600 varieties have been grown in close proximity for several years past."

Rice rotation work with barley, cowpeas, soy beans, velvet beans, jack beans (*Canavalia ensiformis*), and the Chinese matting plants (*Juncus effusus* and *Cyperus tegetiformis*) has been taken up. Among 50 of the best hulled and naked Japan paddy field barleys tested, a large percentage failed to head, but 20 varieties of a very dwarf type set seed and appeared fair yielders of grain. Astragalus used for green manuring proved an entire failure. Windsor beans made a vigorous growth, but almost entirely failed to set seed. Mammoth Yellow soy beans produced 2,500 lbs. of cured fodder (including seeds), or 675 lbs. of seed per acre. Velvet beans yielded 3,420 lbs. of cured fodder or 145 lbs. of seed. Cowpeas yielded 7,200 lbs. of cured fodder or 1,417 lbs. of seed, and jack beans, 4,060 lbs. of cured fodder. In earlier trials also the cowpeas outyielded all other legumes both in green matter and seed.

In a cooperative experiment at Kunia on a light, deep, silty loam, about 600 ft. above sea level, the Seabrook variety of sea-island cotton with a yield of 212 lbs. of lint per acre excelled Caravonica, Mit Afifi, and the upland variety Chinese. Low yields are attributed to a rainfall of only 22 in. for the year and a destruction of 80 per cent or less of the stand by cutworms, which necessitated much replanting. Caravonica cotton gave the greatest promise as a drought resister.

This cooperative experiment was almost duplicated by another at Waipahu, where the elevation is approximately the same but the rainfall estimated to be about 35 in. per annum. Here Mit Afifi and Seabrook produced the highest yields of lint, 101½ and 87½ lbs. per acre, respectively. Early plantings invariably excelled late plantings in yield.

At the station 30 standard cotton varieties have been planted. In a test of 1,200 buds inserted 31 per cent have made satisfactory growth, and from 10 to 60 per cent of the cuttings made took root. In minor trials under more favorable conditions the percentage of successful cuttings exceeded 80.

Eighth biennial report of the state engineer to the governor of Idaho, 1909–10, D. G. Martin (*Bien. Rpt. State Engin. Idaho, 8 (1909–10), pp. 367, figs. 4*).—This is a report of work done under a cooperative agreement between the state board of land engineers and the Irrigation Investigations of this Office.

The author states in detail the soil and other conditions under which the work was done. "Throughout the investigation the amount of water producing the greatest yield is considered as the one most nearly approaching the proper amount for the soil and crop in question." The following table states the principal results obtained:

Data secured from plats irrigated at the more successful rates.

Crops.	Location.	Number of irrigations tested.	Best number.	Depth.	First and last dates of irrigation.	Precipitation April to August, inclusive.	Yield per acre.
				Feet.		*Inches.*	*Pounds.*
Blue stem wheat	Gooding	2, 3, 4, 5, 6, 9	9	2.49		1.41	2,084.30
Sonora wheat	do	2, 3, 4, 5, 6, 9	9	2.35		1.41	2,101.12
Little Club wheat	do	2, 3, 4, 5, 7, 9	9	3.01		1.41	2,635.13
Barley	do	3, 4, 5	5	1.88		1.41	2,026.9
Lincoln oats	do	2, 3, 4	4	1.43		1.41	2,047.81
Blue stem wheat	do	2, 3, 4	4	1.84		1.41	1,581.27
Turkey winter wheat	do	2, 3, 4	4	1.33		1.41	1,742.77
Alfalfa	do	6	6	4.49		1.41	17,375
Peach Blow potatoes	do	3, 5, 6	6	2.05	May 13–Aug. 18	1.41	12,932.3
Oats	do	3, 4, 4	4	2.49	May 19–July 16	1.41	2,837.4
Alfalfa	do	2, 3, 3	3	2.10	May 10–July 27	1.41	9,480
Oats	Richfield	3, 4, 5	4	2.20	May 31–Aug. 14	1.41	886.4
Dicklow spring wheat	Buhl	1, 2, 3	2	1.44	May 26–June 22	1.41	4,065.6
Alfalfa	Rigby	9	9	11.20	May 27–Aug. 23	1.41	8,400
Wheat	do	4, 4, 4	4	2.26	June 10–Aug. 26	1.41	672
Red clover	do	7, 9, 10	9	8.40	May 7–Sept. 1	1.41	9,700
Oats	do	4	4	3.26	June 13–Aug. 6	1.41	847
Wheat	do	3, 4, 5	4	4.73	June 5–July 29	1.41	1,962
Alfalfa	do	4, 6, 7	7	9.40	Apr. 27–Aug. 15	1.41	10,400
Wheat	do	3, 4, 5	5	3.96	June 9–July 29	1.41	2,301
Oats	Idaho Falls	3, 3, 3	3	1.71	June 22–Aug. 12	1.41	2,076.9
Alfalfa	do	4, 6, 6	6	2.22	May 6–Aug. 17	1.41	11,440
Defiance spring wheat	Blackfoot	1, 1, 2	2	2.93	June 9–June 24	1.41	1,590.2
Alfalfa	do	3, 5, 7	7	4.83	May 27–July 25	1.41	9,140
Do	Caldwell	8, 8, 9	9	3.46	Mar. 28–Aug. 19	1.41	8,740
Do	Nampa	7, 7, 7	7	2.11	May 5–Sept. 2	1.41	9,860
Oats	do	3, 3, 3	3	1.22	May 23–June 6	1.41	1,081.6
Spring wheat	Meridian	2, 2, 2	2	.84	May 23–June 22	1.41	2,232.5
Alfalfa	do	6	6	2.82	Apr. 28–Aug. 15	1.41	10,300
Oats	Boise	3, 5, 5	3	1.0	May 21–July 7	1.41	2,349
Do	Idaho Falls	4, 4, 6	4	5.68	June 4–Aug. 5	1.41	1,291

Report of general work on the Buncombe and Transylvania test farms, R. W. Collett (*Bul. N. C. Dept. Agr., 1911, Feb., Sup. pp. 4–16, figs. 11*).—The Buncombe and Transylvania test farms are described and their work briefly outlined.

At the Buncombe farm the work with fertilizers "has shown, as a rule, that the soils on this farm do not respond profitably to applications of nitrogen or potash, but respond readily to applications of phosphoric acid. . . . Two extra cultivations gave 10 bu. increase of corn per acre." Three years experimental work has been completed on soil and crop requirements with fertilizers, variety tests of corn, wheat, oats, and potatoes, and on cultural and other tests.

Report of cooperative field and fertilizer trials in Dalarna and Norrland, 1909, S. RHODIN (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 8, pp. 657–690, figs. 2*).—The author gives an account of the tests conducted by county agricultural societies in northern Sweden, covering 224 different experiments with cereals, roots, pasture, and fertilizers.

Report of the Temir Experiment Field in the Turay-Ural region in the years 1907–8, S. K. CHAIANOV (*Abs. in Zhur. Opyln. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 4, pp. 592–593*).—The experience of the year showed that it is possible to raise cereals on the clays and sand of the Temir district, but the yields in 1907 were generally low owing to winds and weather.

[Experiments with field crops], W. R. GOURLAY (*Rpt. Agr. Dept. Bengal, 1910, pp. 2–6*).—Brief reports are given of experiments in growing jute, cotton, flax, spineless cactus, rice, wheat, potatoes, corn, sugar cane, peanuts, and other crops.

[Fertilizer tests on grass land, including cooperative work], F. W. TAYLOR (*New Hampshire Sta. Bul. 151, pp. 16, 17, 19, 20*).—During the period 1907 to 1910, inclusive, the highest comparative average yields of hay per acre in the fertilizer tests with 12 fertilizing materials on grass land (E. S. R., 21, p. 730) were 3.115 and 2.7 tons of hay per acre, respectively, after (1) 400 lbs. and (2) 200 lbs. of nitrate of soda.

In cooperative experiments on 7 farms average yields of 4,137, 3,901, and 3,158 lbs. of hay, respectively, were secured from the nitrate, complete fertilizer, and manure plats. The check plats gave an average yield of 2,288 lbs. per acre.

Fertilizing permanent marsh pastures, HINRICHS (*Deut. Landw. Presse, 38* (*1911*), *No. 36, pp. 417, 418*).—Results of fertilizer tests here reported show that ammonium sulphate gave excellent results on run-down marsh pastures, but was of no benefit on fairly productive pastures, whereas phosphoric acid and lime fertilizers did benefit the latter.

Alfalfa management, C. W. PUGSLEY (*Nebraska Sta. Bul. 120, pp. 3–13*).—The author gives "explicit instructions in regard to the seeding and care of alfalfa," including a discussion of soils, seeding, inoculation, cultural practices, manuring, seed production, hay, and pasture.

The tillering power of barley, H. TEDIN (*Sveriges Utsädesför. Tidskr., 19* (*1909*), *No. 6, pp. 292–312; abs. in Bot. Centbl., 114* (*1910*), *No. 10, pp. 255, 256*).—The same varieties of barley were observed to vary in tillering capacity in different seasons.

Four-rowed barley in general did not tiller as strongly as the two-rowed varieties. The differences between varieties in the same class were as a rule much smaller than differences resulting from weather conditions, space between plants, and other similar factors. Close planting diminished the tillering power and the use of heavy seed as compared with small seed increased it.

Tests of some improved varieties of barley, J. J. VAŇHA (*Ztschr. Landw. Versuchsw. Österr., 13* (*1910*), *Nos. 7, pp. 634–665; 8, pp. 675–698; 9, pp. 758–785*).—More than 30 varieties of barley were tested and the data secured include the weight per hectoliter, uniformity of grain, kernel weight, percentage of hull, structure of the endosperm, germinative power, protein content, and starch content. Among the varieties tested were many newly developed sorts.

At the experiment station in Brünn, a comparison was made of 85 pure-bred strains. In these the protein content ranged from 9.34 to 12.08 per cent, the starch content from 59.23 to 64.08 per cent, the thousand-kernal weight from 41.61 to 54.45 gm., and the proportion of hull from 9.31 to 12.35 per cent. The vegetative period of these newly bred varieties ranged from 92 to 99 days, the average being 96 days.

[Variety tests of corn and cotton], J. L. Burgess (*Bul. N. C. Dept. Agr., 32 (1911), No. 2, pp. 16*).—Earlier work at some of these farms has been previously noted (E. S. R., 24, p. 336).

In 1910, 21 varieties of cotton were tested on the yellow loam and silt loam soils of the second bottomlands along the Roanoke and the other principal rivers in eastern North Carolina. The higher yields secured are indicated in the following table:

Variety tests of corn and cotton.

Farm.	Crop.	Number of varieties tested.	Variety.	Yield per acre.
				Bushels.
Caledonia	Corn	21	Southern Beauty	41.9
Do	..do	21	Bigg Seven Ear	37.4
Edgecombe	..do	18	Hickory King	35.5
Do	..do	18	Bigg Seven Ear	31.9
Iredell	..do	18	Southern Beauty	39.4
Do	..do	18	Weekley Improved	38.4
Buncombe	..do	18	Southern Beauty	42.3
Do	..do	18	Wilson Success	40.4
Do	..do	19	Henry Grady	70.0
Do	..do	19	Hickory King	64.3
				Pounds.[a]
Caledonia	Cotton	21	Climax	268.0
Do	..do	21	King Reimproved	239.48
Iredell	..do	20	Edgemont	612.0
Do	..do	21	Russell Big Boll	585.0

[a] Lint cotton.

Results from the Karayaz Experiment Field and the demonstration cotton fields in the Transcaucasian region, N. P. Tarat'mov (*Kavkaz. Khoz., 1910, No. 6–7; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 4, pp. 590–592*).—After the application of about 5,000 poods of manure per dessyatina (about 33⅓ tons per acre) from 300 to 400 poods per dessyatina of corn were secured as compared with from 100 to 150 poods per dessyatina without fertilization. The yield of alfalfa hay was similarly raised from 400 or 500 to 1,000 poods per dessyatina, and the yield of King cotton from the United States from 30 to 40 or 45 poods per dessyatina. Summer cereals were grown successfully, although this had been considered impossible in the Transcaucasus, except in the case of rice. Oats yielded 100 poods per dessyatina while barley and summer wheat at times excelled winter wheat in yield. Tests indicated that more rational methods of cultivation accompanied by more moderate irrigation than locally practiced would increase the yields of grain and cotton.

Cotton growing within the British Empire, J. H. Reed (*Scot. Geogr. Mag., 27 (1911), No. 5, pp. 242–257, pls. 2*).—A lecture delivered before the Royal Scottish Geographical Society in Edinburgh, on March 9, 1911, in which the cotton-growing industry in the British Empire is described and reviewed to date.

Lespedeza, or Japan clover, A. D. McNair and W. B. Mercier (*U. S. Dept. Agr., Farmers' Bul. 441, pp. 19, figs. 6*).—This deals with the use of lespedeza for pasturage, as a farm crop, as a companion crop for Bermuda grass, red top, or oats, and in various rotations with corn, oats, cotton, soy beans, and Spanish peanuts. Directions are given for harvesting the crop for hay or seed.

The development of the root system of oats and its relation to nutritive substances, M. A. Egorov (*Dnevn. XII. S''i͡ezda Russ. Est.-Isp. i Vrach. [Moscow], p. 666; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 4, pp. 602, 603*).—These pages report the results of investigations of the development of the oat-root system under the conditions in the Moscow government. The tests were made in boxes and the fertilizers were mixed with the surface 7 in. of soil as it came from the field.

The author concludes that (1) the maximum depth to which the roots penetrated was 118 cm.; (2) the ratio of the roots to the total mass of the plant attains a maximum at the beginning and a minimum at the end of vegetation, being three-fourths of the total mass at the beginning and one-third at the end of vegetation; (3) readily available fertilizers considerably increase the absolute weight development of the root system but decrease its proportionate amount; and (4) there was full harmony in the development of the underground organs and those above the ground.

Systematic classification of oat varieties and the characters of the oat panicle of importance in breeding, Böhmer (*Ber. Oberhess. Gesell. Nat. u. Heilk. Giessen. Naturw. Abt., 3* (*1908–9*), *pp. 1–87*).—This article discusses the form of the kernel, its weight, size with reference to length, width, and thickness, the proportion of hull, the occurrence of twin grains, the color of the grain, pubescence in the grain, and the structure of the base of the kernel.

Cases of spontaneous disappearance of unit characters in oats, H. Nilsson-Ehle (*Ztschr. Induktive Abstam. u. Vererbungslehre, 5* (*1911*), *No. 1, pp. 1–37, pl. 1, figs. 2*).—The author describes cases of the disappearance of a character as observed in plant breeding work with oats, and discusses at some length the influence which such disappearance or suppression may exert in breeding work with this plant. The facts observed indicated that forms of atavism had no connection with crossing, but were entirely spontaneous mutations, each being representative of only one factor or unit character.

Svalöf Fyris oats, H. Nilsson-Ehle (*Sveriges Utsädesför. Tidskr., 21* (*1911*), *No. 1, pp. 24–26*).—The Svalöf Fyris oat is a new black variety especially adapted to the stiff clay soils of central Sweden. The author describes it and states the results of a 7 years' test in which it outyielded all other varieties tested.

The occurrence of a perennial rice in Senegal, P. Ammann (*Jour. Agr. Prat., n. ser., 21* (*1911*), *No. 4, pp. 107–109*).—The author describes a perennial rice which occurs in Senegal and reports analyses of the plant.

Paddy cultivation in Krian, H. C. Pratt (*Dept. Agr. Fed. Malay States Bul. 12, 1911, pp. 19*).—A brief manual of information for the rice grower in the Malay States.

Three years' experiments with fodder beets at Svalöf, I. Karlsson (*Sveriges Utsädesför. Tidskr., 21* (*1911*), *No. 2, pp. 97–105*).—The yields of roots and of dry matter obtained in trials of 4 Svalöf mangels during the period 1908–1910 are reported. Bortfelder and Yellow Tankard excelled Oestersundom and Gray Stone in yield.

The relation between the dry substance of beet leaves and the sugar-building capacity of the plant, K. Andrlík and J. Urban (*Ztschr. Zuckerindus. Böhmen, 34* (*1910*), *No. 6, pp. 335–345*).—It was found that the relation of the weight of the dry matter in the leaves to the quantity of sugar stored in the root is not constant during growth or at the time of harvesting.

At the beginning of the vegetative period the ratio ranges from about 0.5 to 1:1, increasing as growth proceeds and reaching from 2 to 4:1 at maturity.

Some plants when harvested show a wide ratio, while others, especially those low in sugar content, show a narrow one.

The sugar-building capacity of the leaves reaches its maximum about the middle of July, but this period is somewhat dependent on the time the seed germinates. When the leaves are removed about July 1 the consequent new growth will show a greater sugar-elaborating capacity than the older leaves. When the sugar formation is at its maximum, 100 gm. of dry matter in the foliage elaborates from 4.3 to 4.8 gm. of sugar per day.

The average quantity of sugar formed showed little variation during any particular season among the beets grown from different kinds of seed, but the various seasons showed considerable differences in this regard due to the differences in the conditions of growth. In 1906, it was observed that 100 kg. of dry matter in the leaves produced from 2.5 to 2.6 gm. of sugar per day, while in 1907 the daily production reached 3 gm.

Notes on classification and examination of the canes at present indigenous to Bengal, C. S. Taylor (*Dept. Agr. Bengal, Dept. Rec., 1910, No. 3, pp. 21, fig. 1*).—The author describes a number of cane varieties and outlines the chemical work undertaken on them. He presents in tabular form data on the comparative juice extraction of the varieties and the results obtained in the estimation of the fiber and saccharose in their megass.

Cane sugar, N. Deerr (*Manchester, England, 1911, pp. XV+592, pls. 23, figs. 239*).—This is "a text-book on the agriculture of the sugar cane, the manufacture of cane sugar, and the analysis of sugar-house products, together with a chapter on the fermentation of molasses." About 170 pages are devoted to the agriculture involved, but the major portion of the work is devoted to the technical and manufacturing aspects of the subject. Reference lists follow the several chapters, while the preface contains book lists on the agricultural, manufacturing, chemical, analytical, and other phases of the subject, and a list of journals devoted to the sugar industry.

Thickness of sowing summer wheat, depth, and time of plowing under it, A. Aleksandrovich (*Khutoryanin, 1909, No. 50; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 4, pp. 595, 596*).—The author reports results obtained at the Buguruslan experiment field in the Samara government. Four years' data show that plowing 7 and 10½ in. deep in August resulted in yields of 85 and 89 poods per dessyatina (1,135.60 and 1,189.04 lbs. per acre) of grain, respectively. September plowing to the same depths was followed by yields of 81 and 88 poods per dessyatina, respectively. Sowings of 4, 5, and 6 poods per dessyatina were followed by yields of 89, 106, and 111 poods per dessyatina, respectively.

The influence of nitrate of soda applied at different times on the structure of the endosperm and on the protein content of wheat, F. Moertlbauer (*Illus. Landw. Ztg., 30 (1910), No. 98, pp. 903, 904*).—The results of experiments showed that very early top-dressings of nitrate of soda on winter wheat decreased the flintiness of the kernel, while late applications increased this property. In every case where part of the quantity was applied late the hardness of the grain was improved. A top-dressing given when the heads began to form invariably produced a marked increase in the degree of flintiness. Experiments with spring wheat gave very similar results. The dry matter content of the grain was only slightly increased as a result of early applications of the nitrate. The protein content in general varied with the flintiness of the grain of both winter and spring wheat; the correlation, however, not being so definite that the degree of flintiness could serve as a reliable index to the protein content. The results seemed to indicate further that flintiness is not necessarily the only condition which determines the protein content.

Utilization of the nutritive substances from manure by oats and wheat, A. V. Klucharev (*Dnevn. XII. S"i͡ezda Russ. Est.-Isp. i Vrach.* [*Moscow*], *p. 665; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 4, p. 602*).—In sand culture tests manure was compared with other sources of nitrogen, phosphoric acid, and potash.

Three years' experiments show, in part, that the lowest yields were obtained from the vessels with manure without other nitrogen. On introducing manure in place of potash and phosphoric acid the yields were no less than in the normal vessels, and in some cases even higher. Up to 60 per cent of the phosphoric acid was utilized, and up to 93 per cent of the potash as compared with 24 per cent or less of the nitrogen in the manure.

Spraying to eradicate dandelions from lawns, G. T. French (*New York State Sta. Bul. 335, pp. 35–43*).—In 1909 a strip of lawn infested with dandelions was sprayed 6 times between April 23 and September 24 with iron sulphate dissolved at the rate of 1.5 lbs. in each gallon of water. The strip was again sprayed 6 times between April 15 and June 29, 1910, with a solution of 2 lbs. of the sulphate per gallon of water. The blooming of the dandelions was entirely prevented and many of the plants were killed, but there were still 1,085 live dandelions on 1,000 sq. ft. of the lawn in July, 1910, when treatment was discontinued for fear of ruining the lawn. After all but one of the applications the area sprayed was blackened for several days. The grass did not appear materially injured during 1909, but in 1910 the stronger solution and more frequent applications considerably injured it.

The author attributes the lack of success to the vitality of the dandelion roots. To test this, one plant was cut off 7 times and another 8 times below the crown before being finally killed. He briefly summarizes some results of work already noted (E. S. R. 15, p. 360; 19, p. 1036; 21, pp. 635, 737; 23, p. 733).

Spraying fails to kill New York dandelions, F. H. Hall (*New York State Sta. Bul. 335, popular ed., p. 1*).—A popular edition of the above.

Some investigations of the appearance and longevity of weed seeds, K. Dorph-Petersen (*Tidsskr. Landbr. Planteavl, 17* (*1910*), *No. 4, pp. 584–626*).—The investigations here reported were conducted at the Danish seed control station during 1896–1910. The extensive material presented shows that commercial seed, especially clover and grass seed, often contain many thousand weed seeds per kilogram. These seeds possess a good germinating power and often germinate slowly in the course of several years. A large number of weed seeds retain their germinating power for a long period whether in a dry condition or in the ground. It is shown that many weed seeds are not destroyed by the milling process or by passing through the alimentary canal of cattle, swine, or poultry.

Weeds of Ontario, J. E. Howitt (*Ontario Dept. Agr. Bul. 188, 1911, pp. 144, figs. 106*).—Brief discussions of weeds and weed seeds and of sections of the Canadian Seed Control Act are followed by popular descriptions of numerous common weeds and notes on their eradication.

Weeds and their destruction, H. C. Long (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23* (*1911*), *pp. 45–83, figs. 20*).—Descriptions of the worst weeds of Scotland's grass and arable lands are accompanied by directions for their control or eradication.

HORTICULTURE.

Horticultural information.—How to obtain it, B. S. Pickett et al. (*New Hampshire Sta. Circ. 11, pp. 2–8*).—This circular contains suggestions relative to the sources of horticultural information, together with lists of books, bulletins, and periodicals prepared by the members of the department on general horticultural subjects, fruit culture, vegetable gardening, floriculture, greenhouse management, and landscape gardening.

Annual and biennial garden plants, A. E. SPEER (*London, 1911, pp. XX+256, pls. 54*).—In this popular English work the annual and biennial garden plants are arranged alphabetically and briefly considered relative to their value, uses, and culture.

Market gardening, II, R. L. WATTS (*Penn. Dept. Agr. Bul. 201, 1910, pp. 85, pls. 20*).—The subject matter of this bulletin, which supersedes Bulletin 147 of the same series (E. S. R., 18, p. 836), has been brought up to date by the inclusion of newer methods of culture and improvements of methods that have been in common use. The arrangement of the material is quite similar to that in the previous bulletin.

The small garden useful, A. C. CURTIS (*London, 1909, pp. VII+206, pls. 6*).—A popular treatise on vegetable gardening.

Root and stem vegetables, A. DEAN (*London and Edinburgh* [*1911*], *pp. VIII+114, pls. 8*).—The subject matter of this treatise on vegetable growing is based upon the author's long experience as a vegetable grower. The work is confined to vegetables that yield food in the shape of roots, bulbs, tubers, or blanched stems. Chapters on mushroom culture, the preparation of vegetables for exhibition, and a calendar of operations are also included.

Cauliflower and Brussels sprouts on Long Island, L. B. JUDSON (*New York Cornell Sta. Bul. 292, pp. 229–286, figs. 28*) —This bulletin comprises the results of a study of the cauliflower and Brussels sprouts industries on Long Island.

Part 1 deals with the cauliflower and discusses the history and extent of the industry, preparing the soil, rotation, seed, raising the plants, transplanting, fertilization and cultivation, tying, cutting and trimming, packing, storing, yields, prices, profits, and shipping conditions, including an account of the Long Island Cauliflower Association. Consideration is also given to insect pests and diseases, including bibliographies on insect enemies and diseases of cole crops.

Part 2 contains similar cultural details for Brussels sprouts. The bulletin concludes with a general bibliography for each of these crops.

Report of the horticulturist, J. E. HIGGINS (*Hawaii Sta. Rpt. 1910, pp. 25, 26, 27–31, 32–35, 36–40, pls. 2, figs. 4*).—The work during the year dealt chiefly with the avocado, mango, papayas, and citrus fruits.

Satisfactory progress has been made in propagating avocados, especially by budding, the greatest difficulty with this being the forcing them into growth. The sap oozes out from the incision, evaporates, and leaves a crystalline deposit which frequently covers the whole bud and sometimes the whole bud shield. This difficulty has been largely overcome by wrapping the whole of the stock in the region of the incision, thus preventing evaporation. It has been found inadvisable to lop the stock immediately after the bud has become united, since the stock is apt to dry back to the bud and below it before the latter has started into growth. Instead of lopping, the stock may be partly or completely girdled at a point several inches above the bud, only a narrow ring of the bark being removed.

Inarching is being successfully used for certain types of propagation, such as the testing out of seedlings on old trees. Partially successful results in making rooted cuttings of avocados were secured by packing the cuttings in moist sphagnum moss for several weeks before placing them in the propagating bench. Well-matured wood with gray bark proved most promising in this work.

Studies have been made of a large number of varieties of avocados for the purpose of ascertaining their merits for commercial or home production. Four of these varieties of particular merit are here described.

The methods of propagating mangoes previously noted (E. S. R., 22, p. 642) have continued to give good results, and the continued tests of the possibility of transplanting the mango trees show that this operation is relatively simple and successful in a majority of cases. A list is given of the varieties of mangoes now growing at the station.

Observations made on papayas show that both diœcious and monœcious types with various intermediate forms occur in Hawaii. Only a few fruits are borne on the staminate trees of the diœcious type, whereas the monœcious type bears fruit on every tree. It is impossible to distinguish the pistillate and staminate trees at an early age, hence in orchards planted with the diœcious type a certain percentage of the trees will prove to be males and therefore sterile. It seems best to use only the monœcious type for breeding and selection purposes. The work of breeding papayas has been commenced and there is evidence that ultimately a strain will be produced which will come true from seed.

Several new varieties of oranges, pomelos, and lemons were introduced during the year. Successful trial shipments of sweet potatoes to San Francisco were made. It appears to be a good practice to make at least one planting of sweet potatoes for shipment to California some time during the interval between the first of May and the middle of July, when the local potatoes are off the market. Yellow-flesh varieties were preferred.

Brief notes are given on the mangosteen (*Garcinia mangostana*), litchi (*Nephelium litchi*), and *Carissa arduina*, a South African fruiting shrub introduced by this Department. Experiments in growing deciduous fruits at higher altitudes indicate that the outlook is promising for the production of apples, peaches, and grapes.

Tree tanglefoot was used on the deciduous plantings as well as on the station trees for the purpose of preventing ants, cutworms, and other injurious insects from ascending the trees. Under certain conditions it has proved quite effective. Where it has been allowed to remain on peach trees for many months, however, the trees were killed. It is recommended that with peach trees particularly the tanglefoot should not be applied directly to the bark but rather to a band of cheap cotton which has previously been dipped in hot paraffin.

[Notes on horticultural investigations], B. S. PICKETT (*New Hampshire Sta. Bul. 151, pp. 27–29*).—A brief statement of progress made in horticultural investigations at the station during the biennial period ended November 1, 1910.

The effect of various cultivation and fertilizer treatments on the formation of fruit buds is being studied in an apple orchard consisting of some 300 trees. The results noted in 1910, or during the third season, are tabulated showing the fertilizer, cover crop, and cultural treatments, and the percentages of full bloom on each plant. Generally speaking, the plats which were cultivated each year have made the most wood growth and the sod plats the least. Thus far the fertilizers do not appear to have influenced the rate of wood growth.

The rejuvenation of orchards.—Report of spraying experiments in southeastern Ohio, 1910, F. H. BALLOU (*Ohio Sta. Bul. 224, pp. 117–150, figs. 20*).—Following demonstration experiments conducted in 1909 by the station in Washington County on the control of apple scab with Bordeaux mixture (E. S. R., 24, p. 544), this bulletin contains the results of spraying operations conducted by the station and by individual growers during the season of 1910.

In the experiments conducted by the station lime-sulphur was used under many conditions of soil and elevation and on quite a number of the better-known varieties of apples. As compared with Bordeaux of various strengths, the results warranted the substitution of lime-sulphur for Bordeaux mixture. The

Bordeaux injury was particularly prevalent during the season, this fact being attributed to the extreme cold of April and May after a summerlike March. The orchards situated on the thinner, poorer soils suffered extremely, both from the cold and from Bordeaux injury. With orchards situated on fertile soils and with varieties not especially subject to spray injury, there was less difference in favor of lime-sulphur, although the latter spray was superior to a greater or lesser degree in all the tests. The lime-sulphur application appeared to stimulate the growth as well as control the scab. In general the extent of injury by Bordeaux was found to correspond to the lack of vigor of the trees on which it is used.

The results, as a whole, of the spraying work in the county showed that 117 orchards which have yielded an annual average total of 4,446 bu., yielded in 1910, 63,700 bu.

Suggestions for spraying, W. E. RUMSEY, N. J. GIDDINGS, and A. L. DACY (*West Virginia Sta. Bul. 133, pp. 5–26, figs. 5*).—The purpose of this bulletin is to present a summary of data as to the best methods thus far developed by scientific investigators and practical orchardists for fighting plant diseases and injurious insects. It discusses the equipment needed for spraying and gives a spray calendar for the control of the more common diseases and insects of the apple, pear, peach, plum, cherry, grape, and potato, together with information relative to the formulas and preparation of spray materials.

Spraying peaches for the control of brown-rot, scab, and curculio, W. M. SCOTT and A. L. QUAINTANCE (*U. S. Dept. Agr., Farmers' Bul. 440, pp. 40, figs. 14*).—Experiments begun by the Bureau of Plant Industry in 1907 and subsequently continued on a larger scale in different parts of the eastern United States have established the effectiveness of the self-boiled lime-sulphur wash for the control of peach brown-rot and scab (E. S. R., 23, p. 150). Further experiments conducted jointly by the Bureau of Plant Industry and the Bureau of Entomology in 1909 have shown that the curculio may be controlled at the same time at a small cost by adding lead arsenate to the lime-sulphur mixture (E. S. R., 23, pp. 59, 150). Similar cooperative experiments and demonstrations were conducted in 1910, and the results as here given further establish the effectiveness of the combined self-boiled lime-sulphur lead arsenate spray.

The brown-rot, scab, and curculio are discussed with reference to their life history in relation to the peach, including observations with the plum curculio. With the results of the 4 years' experiments as a basis practical information is given relative to the preparation and use of the spray, including a schedule of application for early, midseason, and late varieties.

In addition to cooperative spraying experiments conducted by the Department in Georgia and in West Virginia considerable use was made of the combined mixture by peach orchardists in a number of eastern States, the results having been uniformly satisfactory. Aside from the actual control of the curculio, scab, and brown-rot, the sprayed peaches are as a rule somewhat larger, much more highly colored, and firmer than unsprayed fruit. The observations and experiments also go to show that when used as a summer spray the self-boiled lime-sulphur wash has a material effect on the control of scale insects which may be present on the trees, especially the San José scale. This effectiveness consists largely in bringing about the death of young scales. Further observations are necessary to determine the extent of this benefit, but it is suggested that in peach orchards regularly sprayed with the lime-sulphur wash during the summer, the usual winter treatment for San José scale may not be required so often.

Although no material injury has resulted from 3 applications of lead arsenate in combination with self-boiled lime-sulphur, only 2 applications of the combined treatment are recommended, unless the curculio is very destructive, since a third treatment would increase the danger of injury. Arsenate of lead increases the color of the fruit notably and this increase in color from the 2 applications of the combined mixture improves the appearance of the fruit, whereas the use of arsenate of lead alone creates an excessive coloration, which is often followed by brown sunken spots and more or less extensive cracking of the skin.

From the experience of the authors, it is concluded that in most of the peach orchards of the eastern United States an increase per tree of at least ½ bu. of good merchantable fruit may be obtained from spraying at a cost of from 3 to 5 cts.

Apple growing in New England.—IV, Orchard management, C. D. Jarvis (*Connecticut Storrs Sta. Bul. 66, pp. 217–263, figs. 35*).—The preceding bulletin of this series on apple growing in New England (E. S. R., 23, p. 242) considers the subject of starting young orchards. The present bulletin discusses the various phases of orchard management, including general considerations relative to specialization and diversified farming and the limiting factors in orcharding, cultural systems, soil management, fertilizing, pruning, spraying, and thinning. The bulletin is intended for the diversified farmer more than for the specialized apple grower.

Fertilization and cultural methods for apple orchards, J. P. Stewart (*Penn. Dept. Agr. Bul. 197, 1910, pp. 94–112*).—The subject matter of this paper has been noted from another source (E. S. R., 23, p. 341).

Banana culture, R. Runo (*Mitt. Justus Perthes' Geogr. Anst., Ergänzungsh. 169, pp. VIII+117, pls. 14, map 1*).—In this work the banana is considered relative to its geographic distribution, industrial importance, and cultural history in the various producing countries.

Biometric investigations on a graft hybrid between the pear and quince, L. Daniel (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 18, pp. 1186–1188*).—This consists of a biometric study of the leaf notches of a graft hybrid between the pear and quince as compared with the leaves of a pear of the same variety as the scion growing on its own roots. Measurements of 1,034 leaves were made.

The data show the leaf characters to be more or less intermediate between the parent stock and the parent scion.

A study of the improvement of citrus fruits through bud selection, A. D. Shamel (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 77, pp. 19, figs. 5*).—This circular has been prepared with a view to supplying information to investigators and fruit growers in different parts of the United States regarding the methods of work used in investigating the variation in the yield of citrus fruits in California. No attempt is made to present definite results. The investigation has for its object the demonstration of methods for the elimination of unprofitable trees in citrus groves and the production of reliable select citrus trees for new plantings.

The various phases discussed include varieties of citrus fruits selected for performance records, location of performance-record plats, selection of individual trees, tree markers and numbers, performance records, photographs, picking, grading and sizing, counting and weighing, record blanks, arrangement of data and photographs, note taking, citrus improvement clubs, importance of uniformly productive trees, and the value of reliable select trees.

The cultivation of guavas near Poona, Dharwar, and Limbgaon, L. B. Kulkarni (*Dept. Agr. Bombay Bul. 40, 1911, pp. 12, pls. 4*).—Brief descriptive accounts are given of the cultural methods employed in the above-named regions, including data relative to the cost of establishing and maintaining guava plantations.

Lemon blossoms and why they fall off, J. E. COIT (*Cal. Cult., 36 (1911), No. 23, p. 683, figs. 4*).—A preliminary study of the factors influencing the setting of lemons leads the author to conclude that, other conditions being equal, the annual dropping of blossoms and small lemons in May is due generally to an overproduction of blossoms and fruit rather than to any pathological cause. Experiments conducted this spring indicate that pollination of the blossoms of lemons is not necessary for the setting of fruit and that the presence of bees in lemon orchards may cause the lemon to contain too many seeds by bringing about pollination and fertilization.

A study of the growth of lemons leads the author to conclude that, contrary to a common opinion among lemon growers, the lemons fruit on new growth of the season instead of on old wood. The stems or peduncles growing on old, interior limbs are classed as shortened branches bearing small foliar bracts which represent abortive leaves.

[Pineapple investigations], W. P. KELLEY (*Hawaii Sta. Rpt. 1910, pp. 14-16, 41-43, 45-50*).—A progress report on investigations with pineapple soils and fertilizers, together with results of a study of the composition of Hawaiian pineapples.

In connection with the study of manganese in the soil as affecting the growth of pineapples (E. S. R., 22, p. 240) experiments were made with a number of field crops, garden vegetables, and fruit trees to determine whether they could be grown in rotation with pineapples or replace pineapples in the manganiferous soils. The manganese invariably caused a yellowing of all the leaves and a premature falling of the lower leaves on all plants tested, the ultimate outcome being a decidedly stunted growth and small yield. The root system in manganiferous soils is peculiar in the length and fineness of the small roots. This is attributed to the lack of resistance in the soils, which remain loose like ashes no matter how frequently irrigated

In the fertilizer experiments being conducted with pineapples, the plants treated with dried blood or ammonium sulphate, superphosphate or reverted phosphate, and sulphate of potash have from the first greatly exceeded all others. Although the yields were not entirely satisfactory, these results suggest a possible treatment for soils that contain limited quantities of manganese. Areas that contain 4 per cent or more of manganese are ill suited to pineapple growing. The soil appears to be greatly benefited by the application of soluble phosphates, whereas basic slag produces an increased tendency to a yellowing of the plants as well as reduced yield. It is suggested that soluble phosphates may render the manganiferous salts in the soil less soluble. The addition of lime, on the other hand, results in the development of a more intense yellow color in the plant and its subsequent failure to produce fruit. The studies of manganese relative to its solubility, its relation to other fertilizers, and its physiological functions, etc., are to be continued.

For the purpose of determining some of the facts regarding the composition of pineapples as influenced by the stage of ripeness at which they were gathered, analyses were made and are here reported of fruit normally ripened, just before the beginning of the ripening process, ripened after being picked green, when about one-fourth ripe, and when half ripe. The results show that the sugar content of the fruit is derived exclusively from the leaves of the plant and does not increase after the fruit has been removed from the plant. In general it was found that the acidity increases with the sugar content and that the average of the total sugars is about equal to that of pineapples from Florida (E. S. R., 22, p. 640) and the West Indies. The sugar content of green fruits or fruits ripened after being picked too green is about 2 or 3 per cent, while that of fruits ripened on the plants ranges from 9 to 15 per cent. There is no increase in the sugar content of the fruit picked too green from the time it is removed from the plant, and analysis showed no substance which could be changed into sugar during the ripening process, which in fruits picked green appears to consist largely in a softening of the tissues. In order to obtain a good flavor in fruits, they should not be picked until they have turned yellow at the base to the extent of one-fourth their length.

The graft stocks in dry and lime soils, P. GERVAIS (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 21, pp. 654–658*).—In this paper, presented at the International Congress of Agriculture, Madrid, 1911, the author points out that the results of experiments, observations, and plantings in France and elsewhere have shown the hybrids of Vinifera × Berlandieri to be the graft stocks par excellence for dry and lime soils by reason of their faculties of soil adaptation and of affinity for various kinds of grapes.

Report on the distribution of the grape phylloxera (Phylloxera vastatrix) in Austria in 1907, 1908, and 1909, as well as on the work and results secured in reestablishing infested vineyards, together with the laws, orders, and exemptions dealing with the phylloxera (*Ber. Verbr. Reblaus Österr., 1907–1909, pp. 313, map 1*).—This report covers the various grape growing centers of Austria.

Evolution of the tea trade, J. J. MACFARLANE (*Tea and Coffee Trade Jour., 20 (1911), No. 6, pp. 435–440, maps 3*).—A statistical study of the world's tea trade, with data showing the net imports and consumption per capita for the principal importing countries during the period 1900 to 1910.

Pecans, P. F. WILLAMS (*Bul. Agr. Dept. Ala., 1911, No. 41, pp. 68, pls. 7, figs. 4*).—This is a revision of a previous bulletin of the same series (E. S. R., 22, p. 737). The additional phases herein discussed include cultivation, harvesting, marketing, and staking the ground. A number of plates have been added.

The pecan in Alabama, P. F. WILLIAMS (*Alabama Col. Sta. Bul. 155, pp. 68, pls. 7, figs. 4*).—An edition as a station publication of the bulletin noted above.

Daffodils, J. JACOB (*London and Edinburgh [1911], pp. IX+115, pls. 8*).—A treatise on daffodil culture. The successive chapters discuss the daffodil in books, history, botany and physiology, cultivation, changing bulbs from one garden to another, propagation, raising new varieties by crossbreeding, enemies, diseases, poisons, classification, Royal Horticultural Society classifications, lists of varieties for different purposes, daffodil shows, and a calendar of operations.

The use of acid soils for raising seedlings of the Mayflower (Epigæa repens), F. V. COVILLE (*Science, n. ser., 33 (1911), No. 853, pp. 711, 712*).—The development of a system of cultivating the swamp blueberry (*Vaccinium corymbosum*) by the use of acid soils (E. S. R., 24, p. 433) suggested that a similar method might succeed with the trailing arbutus because the two plants have the same natural habitat and also because the arbutus has a symbiotic root fungus similar to that found on blueberry roots.

Seeds of the trailing arbutus were procured in New Hampshire in July, 1909, and sown in a mixture of kalmia peat, sand, and sphagnum. They germinate in August and after successive transplantings in an acid soil consisting of 9 parts kalmia peat by bulk and 1 part clean sand, the plants begin to form their flowering buds in August, 1910. The larger plants more than filled a 5-in. pot. They were left outdoors during the winter, were brought into a cool greenhouse in March, and came into flower in a few days. The flowers had the characteristic color and fragrance of wild ones and were of large size.

Plants kept in a greenhouse all winter flowered only sparingly but permitted of a study of the fruit which is not a loculicidal capsule as generally described. Its style of dehiscence is given as "septicidally or rather marginicidally septifragal." In examples of perfect development the wall of the fruit while still green and herbaceous splits along the cell partitions into 5 valves which spread backward into a 5-pointed rosette, exposing the white, fleshy, succulent interior with the minute brown seeds dotted over its surface. The fleshy part, which resembles an unripe strawberry, is about ¼ in. in diameter and consists of the whole interior of the fruit, axis, and dissepiments as well as placentæ.

The small garden beautiful, A. C. Curtis (*London, 1909, rev. ed., pp. X+155, pls. 25, fig. 1*).—A popular treatise on garden design, discussing the ground work, the herbaceous border, hardy perennial plants and bulbs, small rock and water gardens, roses, shrubs and climbers, and the small kitchen garden. A number of garden plans are included in the illustrations.

The suburban garden guide: Planting time-tables, how and when to spray, what to grow—and how, P. T. Barnes (*New York, Harrisburg, Pa., and Chicago, 1911, pp. 64*).—A concise popular handbook of information.

Report of the Board of Metropolitan Park Commissioners (*Rpt.* [*Mass.*] *Bd. Metropol. Park Comrs., 18 (1910), pp. 158, pls. 7, maps 6*).—This is a report of the Metropolitan Park Commissioners of the Commonwealth of Massachusetts. It comprises the reports of the commissioners, the secretary, and the engineer, and a financial statement for the year. The reports of work conducted on various projects are appended.

FORESTRY.

The commercial woods of the United States and their uses, G. T. Surface (*Bul. Geogr. Soc. Philadelphia, 8 (1910), No. 3, pp. 20–34, pls. 5*).—The author outlines briefly the geographic timber belts and the important merchantable species occurring in each belt, points out the factors governing the adaptation and value of wood, and indicates the kinds of wood suitable for various classes of construction.

The aspens: Their growth and management, W. G. Weigle and E. H. Frothingham (*U. S. Dept. Agr., Forest Serv. Bul. 93, pp. 35*).—This bulletin presents important facts concerning the aspens and suggests methods by which aspen stands may be profitably managed.

The phases discussed include the species of aspens and how to distinguish them, the wood and its use, pulp-wood logging, general and commercial range of the aspen, climatic, soil, and moisture requirements of the tree, its growth, size, and longevity, susceptibility to injury, and reproduction by seed and by suckers. Aspen stands are discussed relative to their origin, development, and decadence in the Northeast and their management, both as temporary and permanent crops. Volume tables for aspen are appended. The chief uses of the aspen at present are for paper, pulp, excelsior, and fuel.

Properties and uses of Douglas fir, McG. Cline and J. B. Knapp (*U. S. Dept. Agr., Forest Serv. Bul. 88, pp. 75, pls. 3, dgms. 15*).—Since 1903 the Forest Service has been making a comprehensive series of tests to determine the mechanical properties of the commercial woods of the United States, general summaries of the results secured having been previously noted (E. S. R., 19, p. 651).

Part 1 of this bulletin, which deals with the mechanical properties of Douglas fir, is based on tests made in cooperation with the University of California, Berkeley, Cal., and the University of Oregon, Eugene, Oreg. The data are presented in numerous tables and diagrams and further discussed under the following headings: General results of tests; methods of test; bending tests; tests in compression parallel to grain; tests in compression perpendicular to grain; shearing tests; average results of tests and variation of results; relation of physical characteristics to mechanical properties, including a discussion of color, weight, proportion of summerwood, rate of growth, and various defects; failure under compression, cross-grain tension, tension, and horizontal shear; grading rules and specifications, including a discussion of these in their relation to the results of the mechanical tests; and seasoning, including the distribution of moisture in green and air-seasoned specimens, rate of seasoning, shrinkage during seasoning, effect of seasoning on strength, and failure in seasoned timber. The tests as a whole are summarized. The results are of special interest to the users of structural timber.

Part 2, which deals with the commercial uses of the timber, is based on information furnished by lumber manufacturers and other industrial concerns that use Douglas fir. The special features given are relative to its preparation and utilization for piling, poles, mine timbers, railway ties, bridge and trestle timbers, timber for car construction, all kinds of lumber for houses, material for the furniture maker and boat builder, cooperage, tanks, paving blocks, boxes, pulpwood, fuel, and miscellaneous commodities, including wood for distillation.

The Eucalyptus in Texas, J. H. Arbenz (*Texas Dept. Agr. Bul., n. ser., 1911, No. 8, pp. 9, figs. 5*).—A brief statement is given relative to the behavior of different species of eucalypts which have been tested in a number of places in southwest Texas. During the severe weather in January, 1911, those trees less than 3 years old were in most cases killed to the ground, the temperature having ranged all the way from 12 to 20° F. With trees 4 years and more of age, the greater number of the lateral branches were killed but the main trunks escaped.

Red gum (*Eucalyptus rostrata*) has been more widely planted than any other variety and is considered a standard variety for south Texas.

Gum and resin yielding plants, H. J. de Cordemoy (*Les Plantes a Gommes et à Résines. Paris, 1911, pp. XIV+412, figs. 15*).—A handbook of information relative to the botany and exploitation of the various gum, resin, and gum-resin yielding plants, together with the chemistry of the various exudations, including information relative to their principal properties and characters and their application in the industries and arts.

[Rubber investigations], E. V. Wilcox (*Hawaii Sta. Rpt. 1910, pp. 17, 18*).—Visits to all of the commercial rubber plantings in Hawaii during the year revealed a satisfactory growth in the plantations located in various altitudes up to 1,400 ft., above which elevation no commercial plantings have been made. Ceara rubber grows much more rapidly than Hevea rubber, and it remains to be determined whether the ultimate yield of Hevea will be sufficiently large to make up for its slowness of growth. Trees which have received clean cultivation since planting are larger at 2 years of age than 6-year-old trees which have not been cultivated. Cultivation appears to be of particular value in aerating the soil.

Fustic wood: Its substitutes and adulterants, G. B. Sudworth and C. D. Mell (*U. S. Dept. Agr., Forest Serv. Circ. 184, pp. 14, figs. 4*).—The wood of the fustic tree (*Chlorophora tinctoria*), a native of the West Indies and tropical America, which yields valuable yellow, brown, and green dyestuffs, is frequently adulterated with or replaced by different woods, of which the more important are the smoke tree (*Cotinus cotinus*), osage orange (*Toxylon* *pomiferum*), and several species of the prickly ash (Xanthoxylum). This circular points out the distinguishing characteristics of genuine fustic wood and of its principal substitutes in order that consumers may readily distinguish the real from the spurious article. A full description of the microscopic structure of fustic wood is presented as a guide for the detection of possible new and at present unknown substitutes.

Preservative treatment of poles, compiled by W. H. KEMPLER (*U. S. Dept. Agr., Forest. Serv. Bul. 84, pp. 55, pls. 4, figs. 11*).—This bulletin summarizes the results published in previous Forest Service circulars (E. S. R., 20, p. 48), and presents additional data and information gained by the more recent investigations, especially those by O. T. Swan.

The subject matter is discussed under the following general headings: General principles of wood preservation; Forest Service investigations; résumé of projects; results of seasoning tests; brush method and open-tank process of treating poles; advantages and limitations of the open-tank process; results of treatments by species, including chestnut, southern and northern white cedar, western red cedar; western yellow, lodgepole, and loblolly pine, and cypress; design and operation of pole treating plants; increased life afforded by preservative treatment; financial saving; relation of preservative treatments to pole specifications; and growth and form of poles. The results of the investigations as a whole are summarized.

The appendix contains a report on an inspection of experimental southern white cedar and chestnut poles previously treated by the Forest Service in cooperation with the Southern Bell Telephone and Telegraph Company (E. S. R., 19, p. 243). In addition to a summary and discussion of the condition of the poles under the various treatments, analyses are given of the preservatives used. Detailed tables and curves showing the rate of seasoning of poles are also appended.

Fourth annual report on forest conditions in Ohio (*Ohio Sta. Bul. 223, pp. 57–116, figs. 19*).—This comprises a brief introductory report by C. E. Thorne (pp. 57–59), a report of the consulting forester, by W. J. Green (pp. 60–62), in which the station's policy in cooperating with public institutions and cities in the study and testing of ornamental trees, shrubs, and shade trees is outlined, and a report of the forester, by E. Secrest (pp. 63–116).

As noted in the report of the forester the chief lines of work in which the station has been active during the year ended October 1, 1910, are as follows: Cooperation with public institutions possessing land as to the management of timber tracts and the establishment of experimental and demonstration plantations; cooperation with private owners in the improvement of the farm woodlot and in various operations of reforestation; and the establishment of nurseries for experimental purposes and the distribution of forest-tree seedlings in connection with the various operations of cooperative work. The forest survey of the State was conducted as in previous years (E. S. R. 23, p. 44), 10 additional counties being surveyed during the past season. The results of the survey are summarized. Educational work was conducted through various agencies.

Among the chief destructive agencies of forests in Ohio particular attention is called to the European pine blister rust (*Peridermium strobi*), which was recently introduced from Germany (E. S. R., 21, p. 644), and has been found occuring in 2 Ohio nurseries within the past year.

Among the recommendations suggested for the improvement of forest conditions in Ohio are a better system of fire protection, including a fire warden service, the establishment of state forest reserves, the regulation of stream flow, protection and jurisdiction of shade trees, and assistance in the establishment of municipal forest parks. The text of the laws of Ohio relating to forestry are appended.

Review of forest administration in British India for the year 1908–9, with a quinquennial summary, F. B. BRYANT (*Rev. Forest Admin. Brit. India, 1908–9, pp. 58, maps 2*).—This is the customary annual progress report on the constitution, management, financial results, and administration of the state forests in the various Provinces of British India for the year ended June 30, 1909.

All the important data relative to forest areas, various forest operations, forest products, yields, returns, etc., are appended in tabular form, including summarized data showing the financial returns for the quinquennial periods from 1873–4 to 1907–8. Maps are also appended showing the distribution of forests and waste lands as well as the progress of forest surveys and working plans in India.

The total area of forest lands under control of the forest department was increased during the year by 3,965 square miles to a total of 241,774 square miles, or 24.5 per cent of the area of British India. In addition some 12,193 square miles of forest lands are controlled by other departments. Of the total area of reserves, 46,432 square miles, or 49 per cent, was under systematic fire protection.

Experiments carried out by the forest department have shown that Para rubber (*Hevea brasiliensis*) can be successfully grown in southern Burma and *Ficus elastica* in Assam. Little success has attended the efforts to grow these and other rubber-producing species in other parts of India.

The gross revenue for the year was 25,456,799 rupees ($8,258,949.30), the gross expenditure 14,726,034 rupees ($4,777,567.21), and the surplus over expenditure directly chargeable to revenue was 17,820,061 rupees ($5,781,462.39).

Progress report of forest administration in the Province of Eastern Bengal and Assam for the year 1909–10, A. V. MONRO, H. CARTER, and W. E. MELLOR (*Rpt. Forest Admin. East. Bengal and Assam, 1909–10, pp. 16+15+77+3, map 1*).—This is the usual progress report relative to the constitution, management, financial results, and administration of the state forests in the Western and Eastern Circles, Eastern Bengal, and Assam, for the year ended June 30, 1910.

All the important data relative to forest areas, various forest operations, forest products, revenues, returns, etc., are appended in tabular form.

The need of afforestation in the United Kingdom of Great Britain and Ireland, A. D. BLASCHECK (*Sci. Prog. Twentieth Cent., 5 (1911), No. 20, pp. 611–641*).—This consists of a résumé of the history of forestry in Great Britain, together with a discussion of forestry in relation to the employment of land, capital, and labor and the indirect effects produced. The paper concludes with suggestions for the improvement of existing forests.

Suggestions for woodlot owners in Maine, J. M. BRISCOE (*Maine Sta. Doc. 402, pp. 27, figs. 8*).—The author considers that for the individual owner of woodland in Maine there is no tree better suited either for regeneration by methods of natural reproduction or for planting than the white pine. The chief characteristics of this species are described in detail and directions are given for the best methods of treatment in the development of pure stands and of stands mixed with hard woods.

The farmer's plantation, A. MITCHELL (*Dept. Int. Canada, Forestry Branch Bul. 10, 1910, pp. 23, figs. 13*).—A bulletin of poplar information prepared to assist farmers in arranging their forest plantations to the best advantage and in bringing them to a successful issue. The following phases are discussed in detail: Narrow *v.* broad belts, arrangement of plantations, home plantations, preparation for planting, planting the trees, care of plantations after planting, distances between trees, pruning, thinning, the use of willow and poplar cuttings, gaps in plantations, transplanting, and grading up poplar bluffs.

Wide belts are considered better than narrow ones since they afford better shelter, are cheaper to maintain, and furnish better as well as more material in after years.

Tree planting on the prairies of Manitoba, Saskatchewan, and Alberta, N. M. Ross (*Dept. Int. Canada, Forestry Branch Bul. 1, 1910, pp. 104, pls. 34, figs. 2*).—This bulletin has been prepared with the idea of furnishing practical information to the settler on the western prairies as to the best methods of propagating, planting, and managing hardy trees for shelter belts, windbreaks, and plantations. The information is based upon the successful results of planting and general nursery work. Only such trees as have been proved absolutely hardy are recommended for planting.

Part 1 discusses the natural conditions and the benefits to be derived from tree planting on the prairies, and gives directions for establishing plantations. Part 2 contains information relative to the character, uses, cultural requirements, and methods of propagating the various deciduous and coniferous trees recommended.

Our timber wealth and its conservation, W. J. Sutton (*Bul. Nat. Hist. Soc. Brit. Columbia, 1910, Jan., pp. 20*).—The author presents a general survey of the forest trees of the Province of British Columbia and calls attention to the questions of conservation and reforestation.

The Olympic National Forest: Its resources and their management, F. Burns (*U. S. Dept. Agr., Forest Serv. Bul. 89, pp. 20, pls. 3*).—This bulletin contains an account of the Olympic National Forest in the State of Washington relative to its resources, topography and drainage, land classification, water and agriculture, water power, timber, burns, grazing, mining, settlement, and permanent improvements.

The merchantable stand within this forest approximates 25,500,000,000 ft. b. m. It was established to provide a permanent supply which could be drawn upon when the immense stands now upon private holdings have been cut away. It is estimated that the forest is capable of producing a sustained annual yield of 250,000,000 ft. b. m.

Forest products of Canada, 1909.—Pulp wood, H. R. MacMillan (*Dept. Int. Canada, Forestry Branch Bul. 12, 1910, pp. 9*).—The pulp wood consumption in Canada is shown by species, Provinces, and processes. There were produced in Canada in 1909, 1,537,762 cords of pulp wood, valued at $9,216,739; 622,129 cords being manufactured there into pulp and 915,633 cords being exported in the raw state.

Forest products of Canada, 1909.—Poles purchased, H. R. MacMillan (*Dept. Int. Canada, Forestry Branch Bul. 13, 1911, pp. 7*).—A statistical review based upon data received from the telegraph, telephone, electric light and power companies, and the electric and steam railroads operating in Canada. The number, total cost, and average cost are given by species, chief uses, and length classes, including comparative data for 1908. The prices of cedar poles in the United States and Canada in 1908 are also compared.

The total number of poles purchased in Canada in 1909 was 358,255, or 92.9 per cent more than in 1908. Cedar is the wood most frequently used, since it is cheap, easily handled, and durable.

Forest products of Canada, 1909.—Cross-ties purchased, H. R. MacMillan (*Dept. Int. Canada, Forestry Branch Bul. 14, 1911, pp. 8*).—A statistical review for the year based upon data furnished by the steam and electric railways of Canada.

There were 14,178,241 cross-ties, costing $5,210,490, purchased by the above railways in 1909. The number and cost of cross-ties are shown by species.

Comparative data relative to the service and cost of treated and untreated ties of common Canadian woods show an annual saving in using treated ties of from 0.2 ct. per tie with cedar to 2.35 cts. per tie where jack pine is used. For the same 2 species the annual saving per mile of track is estimated at $6 and $70.50 respectively.

Forest products of Canada, 1909.—Tight and slack cooperage, boxes and box shooks, H. R. MACMILLAN (*Dept. Int. Canada, Forestry Branch Bul. 19, 1911, pp. 12*).—A statistical report for the year 1909.

The total value of tight and slack cooperage stock manufactured in Canada in 1909 amounted to $1,842,235, of which 86.6 per cent represented the value of the slack cooperage stock. Lumber for boxes and shooks was consumed to the value of $1,264,376.

Forest fires and railways, R. H. CAMPBELL (*Dept. Int. Canada, Forestry Branch Bul. 16, 1911, pp. 8, figs. 2*).—This bulletin considers the relation of the railways to forest fires in Canada. The phases discussed include fires arising from railway construction, fires arising from clearing right of way, locomotive equipment, damages, and penalties.

DISEASES OF PLANTS.

Investigations on the dissemination of microscopic spores in the atmosphere, G. BONNIER (*Bul. Soc. Nat. Agr. France, 71 (1911), No. 3, pp. 292–302, figs. 2*).—In addition to giving the results previously reported from another source (E. S. R., 25, p. 143) under this title, the author discusses the influence of rain on the number of spores in the atmosphere of a given locality. It was found that immediately after a rain fewer spores were present in the air, as determined on a given culture medium, than before the rain.

Report of the mycologist for the year ending March 31, 1911, I, J. B. RORER (*Bd. Agr. Trinidad Circ. 2, 1911, pp. 1–5*).—This report deals with the administrative work and briefly notes the work done along mycological and pathological lines during the past year.

Report on plant diseases for the year 1908–9, R. SCHANDER (*Ber. Pflanzenschutz, Abt. Pflanzenkrank. Kaiser Wilhelms Inst. Landw. Bromberg, 1908–9, pp. 161, figs. 18*).—The distribution, prevalence, severity, and method of control of diseases of field, forest, orchard, and garden crops are discussed.

In the first part of the report the general conditions of various crops of the year are taken up. In the second part special reports are made on the pests (fungus, insect, and weed) of each crop in detail, and the results of experiments for their control are noted.

Special attention was given to the heart or dry rot of beets, the potato leaf-roll disease, and blackleg of the potato (E. S. R., 23, p. 348, 745; 24, p. 46). The effect of different soils, fertilizers, and table salt on the heart or dry rot of beets is given. In studying the leaf-roll disease the amount of diseased and sound plants of several varieties of potatoes was obtained by using, first, several sound seed tubers, and, second, diseased tubers for seed. The relative resistance and susceptibility of many varieties of potatoes is also noted. Blackleg of the potato was widespread during this year, and was often mistaken for the leaf-roll disease.

On the distribution of fungus diseases of plants in Russia during 1908, A. A. IACHEVSKIM (*Ezheg. Dept. Zeml. [Russia], 29 (1908), pp. 678–698*).—The prevalence of the common diseases of field, forest, orchard, and garden crops, and the damage done by them are noted.

On the distribution of fungus diseases of plants in Russia during 1909, A. A. IACHEVSKIM (*Ezheg. Dept. Zeml. [Russia], 30 (1909), pp. 574–601, pls. 2, fig. 1*).—The distribution is given of the common diseases of field, forest, orchard, and garden crops.

Root diseases caused by Armillaria mellea, W. H. LAWRENCE (*Better Fruit, 5 (1911), No. 10, pp. 41–44, figs. 5*).—The author figures and describes the characteristics of the fungus, and gives its prevalence and the damage done by it in the Puget Sound country. It was found infesting and killing the apple, plum, cherry, gooseberry, prune, currant, blackberry, raspberry, and loganberry.

Fungus diseases of ground nuts in the West Indies, F. W. SOUTH (*West Indian Bul., 11 (1911), No. 3, pp. 157–160*).—The author describes 3 fungus diseases of ground nuts, 2 attacking the leaves, viz, *Uredo arachidis* and *Cercospora personata*, and an unidentified root fungus.

The rust fungus (*U. arachidis*) is of general distribution, both on local and imported varieties, and the damage done by it varies on the different islands. On some of the islands spraying with Bordeaux mixture was said to be effective in checking the rust, while on other islands neither Bordeaux mixture nor the application of a lime-sulphur mixture appreciably checked the disease.

The root disease occurs on the ground nuts in Barbados, Granada, Dominica, St. Kitts, and Nevis. Attacked plants wilt rapidly and in 2 days from the first wilting of the leaves are completely dead. The fungus kills the roots and then spreads to the collar, base of the stem, and the surface of the nuts, but does not appear to penetrate the nuts themselves, since diseased nuts when disinfected with corrosive sublimate solution produce healthy plants. The fungus when young forms a cobweb-like covering over the diseased portions. The hyphæ are colorless and provided with occasional clamp connections. As they grow older, yellow to brown filaments arise in a characteristic manner. No fructifications have been found, but numerous spherical, smooth, brown sclerotia 1 mm. in diameter frequently occur.

The fungus has been found attacking Aroids, Antirrhinums, some Compositæ, eggplants, tomatoes, seedling lime trees, and alfalfa. No certain remedy is known for successfully disinfecting the ground when it is once thoroughly infected, but liming the soil and permitting it to lie fallow for several months is suggested as a possible remedy. Immersion for 5 minutes in 1:1,000 corrosive sublimate is advised for disinfecting the diseased nuts intended for seed.

Rice disease caused by Ustilaginoidella graminicola, E. ESSED (*Ann. Bot. [London], 25 (1911), No. 98, pp. 367, 368, pl. 1*).—This disease first appears on the rice leaves and sometimes on the sheaths as dark brown, intercostal spots with yellowish margins. A species of Panicum is also attacked by the same organism.

An examination of the diseased areas showed the presence of a fungus, for which the name of *U. graminicola* is proposed.

Spongospora subterranea, T. G. B. OSBORN (*Ann. Bot. [London], 25 (1911), No. 98, pp. 327–341, pl. 1*).—The author gives in detail the results of his investigations, a preliminary account of which has been previously noted (E. S. R., 24, p. 742), of the life cycle of this potato scab, including cytological studies of its vegetative and reproductive phases and its effects upon the host plant.

It is claimed that Spongospora belongs to the Plasmodiophoraceæ, which group has many points of relationship to the Mycetozoa, differing chiefly in the parasitic habit, in the method of division of the vegetative nuclei, and in the less constant presence of the flagellum on spore germination.

Oospores of potato blight, G. P. CLINTON (*Science, n. ser., 33 (1911), No. 854, pp. 744–747*).—The author claims to have produced perfect oogonia, antheridia, and oospores of *Phytophthora infestans* from pure cultures of the organism grown on a special culture medium.

The oogonia are thick-walled with a more or less roughened or ornamental external coat, and tinted more or less a chestnut brown, while the oospores are moderately thick-walled, smooth, and colorless.

It is also claimed that crosses between *P. infestans* and *P. phaseoli*, and between *P. infestans* and *P. cactorum*, have been obtained by growing mixed cultures of these organisms. The crosses produced oospores, some of which resembled the *P. infestans* type and others the *P. phaseoli* or *P. cactorum* type. However, none of the oospores germinated.

A history of the damping-off disease of sugar beet seedlings, A. Stift (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 40 (1911), No. 2, pp. 211–251*).—The author briefly reviews the opinions of prominent investigators as published during the past 10 years on the probable causes of this disease and methods used for its control.

On the history of the heart or dry rot of the sugar beet, A. Stift (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 40 (1911), No. 2, pp. 252–273*).—A brief summary is given of the views of prominent investigators as published during recent years on the cause of this disease, the effects of various fertilizers on it, and methods for its control.

[A fungus disease of the avocado], J. E. Higgins (*Hawaii Sta. Rpt. 1910, p. 27*).—Attention is called to a fungus disease of avocados, probably caused by a species of Glœosporium, which is prevalent in many parts of the Territory of Hawaii and causes much damage. It turns the attacked leaves a rusty, brown color, and frequently causes them to fall prematurely. It also causes a dying back of the twigs and branches which often terminates in the total destruction of the tree. Flowers were sometimes attacked, the disease extending into the new wood.

Preliminary tests are being carried out with 4 fungicides, viz, 6:6:50 Bordeaux mixture plus arsenate of lead, a resin-lime mixture consisting of 2 gal. of resin lime to 48 gal. of dilute Bordeaux mixture, a 6:6·50 self-boiled lime-sulphur mixture with arsenate of lead, and a 1:30 commercial lime-sulphur mixture with arsenate of lead.

So far none of the sprays have produced any serious foliage injury, but it is yet too early to judge of the fungicidal results.

The Panama disease, I, II, E. Essed (*Ann. Bot. [London], 25 (1911), No. 98, pp. 343–361, pls. 2*).—A study is reported of the characteristics and cause of this banana disease. It is claimed that a species of fungus belonging to the Hypocreaceæ, and for which the name *Ustilaginoidella musæperda* is proposed, is its true cause.

The author claims to have isolated the fungus, and descriptions are given of various spore forms, sclerotia, conidia, several kinds of chlamydospores, mycocecidia, etc. Two species of bacteria (*Micrococcus sulfureus* and *Bacterium fluorescens*) were found associated with the fungus.

In the second paper the author gives the results of further studies on the organism and of inoculating experiments with the organism and with the 2 associated bacteria. The so-called sclerotium noted in the first paper is here called pegmatium, and is defined as a structure which arises from well-nourished hyphæ and hardens into gristly or gummy bodies having the power to regenerate the fungus by means of chlamydospores or by mycelia arising from them without the interposition of a spore stage.

The reproductive organs are given as ascospores (none of which have yet been found), conidia, chlamydospores, and oidia. Two enzyms were found to be secreted by the fungus, one, probably cytase, capable of dissolving the cell walls of the host, and the other a proteolytic enzym. The hyphal walls of the fungus were found to be composed almost entirely of chitin. Inoculation experiments with pure cultures of the fungus and of the 2 associated bacteria gave positive results as to the parasitic nature of the fungus, but negative results with the 2 bacteria.

The author therefore claims that *U. musæperda* is the cause of the Panama disease of bananas as it occurs in Surinam.

The Surinam disease; a condition of elephantiasis of the banana caused by Ustilaginoidella œdipigera, E. Essed (*Ann. Bot.* [*London*], *25* (*1911*), *No. 98, pp. 363–365, pl. 1*).—It is claimed that "big foot" disease of the banana, or elephantiasis, is caused by a fungus for which the name *U. œdipigera* is proposed.

This organism is said to be closely related to the Panama disease fungus, *U. musæperda*, but differs slightly in some of its reproductive bodies. The fungus first attacks the parenchyma and prosenchymatous cells of the peripheral upper region of the rhizome, and the initial infection probably occurs just below the base of the outermost leaves.

The disease is not a serious one, does not spread rapidly, and is easily kept in check by the use of copper-sulphate solutions.

Diseases of the fig tree and fruit, C. W. Edgerton (*Louisiana Stas. Bul. 126, pp. 20, pls. 8*).—The author gives the life history, symptoms, distribution, damage done by them, and methods of control of the following diseases of the fig tree in Louisiana: Fig anthracnose (*Glomerella fructigena*), fig canker (*Tubercularia fici*), limb blight (*Corticium lætum*), soft rot of the fig (*Rhizopus nigricans*), fig rust (*Uredo fici*), leaf spot (*Cercospora* sp.), die-back of the twigs, and nematode root galls.

It is claimed that the fungus causing fig anthracnose is the same organism (*G. fructigena*) that causes bitter rot of apples. It has been known on the fig for at least 5 years in Louisiana, and is characterized by definite localized sunken lesions, or by a general rot of the whole fruit very similar to the lesions on apples due to bitter rot. Cross inoculations were made with this fungus and other anthracnoses from *Melilotus indica*, cotton, silver maple, apple, pepper, *Populus deltoides*, clover, and beans. Perfectly typical lesions of the bitter rot appeared on the apple, fig, pepper, and maple, while no infection was produced on cotton, clover, Melilotus, and beans. Other experiments were also tried, using both apples and figs and the apple and fig anthracnoses, and in all cases the results with the 2 forms were identical.

Tests made during the year as to the varietal resistance of different types of figs against anthracnose showed that the varieties could be grouped under 3 heads, viz, (1) those quite severely affected, such as Madeleine and New French, (2) those less severely affected, such as Drop d'Or, Honche de Bray, and Osborne Prolific, and (3) those affected very little or not at all, such as Mission, Brunswick, Reme Blanche, White Ischia, De Constantine, and Celeste. The use of resistant varieties is recommended as the most practical means of controlling this disease, but if susceptible varieties are already planted, the removal of all fig mummies in the fall and the careful pruning of all dead limbs and twigs is suggested as the best means of holding the disease in check.

Fig canker and limb blight have been previously noted from another source (E. S. R., 24, p. 747). The soft rot of the fig may occur to some extent in any season, but is especially severe during wet periods, when often as much as ¾ of the figs on a tree will be destroyed by this disease. It is disseminated by wind-blown spores, by insects, especially the Argentine ant, by juice from a diseased fig dropping to other portions of the tree, and by rains washing the spores off on other parts. The remedies advised are frequent picking of the ripe figs, keeping the ants out of the trees by means of ant tape, etc., and by planting varieties not readily susceptible to the disease, such as Celeste and Reine Blanche.

The fig rust is a very common disease, and usually defoliates the trees in the late summer. No treatment for it is known. Leaf spot and die-back are of little economic importance so far, while the root galls due to nematodes are often quite troublesome in sandy soils but of little importance in sticky, clayey soils. A 3-year rotation with other crops is said to control this disease.

A bibliography is appended.

The American gooseberry mildew order of 1909, T. H. MIDDLETON (*Bd. Agr. and Fisheries [London], Intel. Div., Ann. Rpt. Proc. 1909–10, pp. 73–76*).—This order in regard to the control of the American gooseberry mildew is printed in full. It includes directions as to notification of the disease, investigations and action by local authorities, precautions to be observed against the spread of the disease, a prohibition of the importation of the bushes, the powers of boards and inspectors, and penalties under the act.

The influence of the stock on the susceptibility of the graft to grape mildew, L. RAVAZ (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 19, pp. 598–600*).—The author claims that in grapes where the union between scion and stock is perfect, resulting in a vigorous, succulent growth, the susceptibility is increased, while the reverse is true of unions in which there is not a perfect affinity between scion and stock, resulting in a less vigorous and therefore less watery condition of the foliage and young shoots.

The method of the action of sulphur used in combatting powdery mildew, R. MARCILLE (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 12, pp. 780–783*).—The author claims that experiments have not been carefully conducted in determining the manner in which sulphur acts as a fungicide, and he has carried on some experiments in Tunis to settle this point.

It has generally been asserted that the sulphur acts through its volatilization or oxidation, but the author found that under the conditions of his experiments these two functions were of very little importance. He claims that sulphur used for the prevention of powdery mildew owes its efficiency to the sulphuric acid which it contains. Pure sublimed sulphur was found to contain from 0.2 to 0.625 per cent anhydrous sulphuric acid. The sulphuric acid which the sulphur contains under ordinary conditions does not injure the tissues of the plant, but when, through condensation of humidity, the conditions favor the development of mildew, the small drops which form dissolve the acid and impregnate the spores and mycelium of the fungus, which are killed through the concentration of the acid due to evaporation of the solution.

This hypothesis, it is said, explains particularly the efficiency of the extra sublimed sulphurs, as they contain notable quantities of sulphuric acid, while the ordinary and triturated forms of sulphur contain it in very small amount.

The author thinks that for use as a fungicide sulphur should be prepared in such a way as to contain a greater amount of sulphuric acid than that which is ordinarily furnished.

The black-rot disease of grapes, D. REDDICK (*New York Cornell Sta. Bul. 293, pp. 289–364, pls. 5, figs. 16*).—This is a comprehensive discussion of the black rot of grapes, based in part on original investigations by the author, including a history of the disease, the geographical distribution, economic importance, symptoms, name and life history of the parasite, and the meteorological relations, incubation period, period of susceptibility, longevity of pycnospores, pathological histology of the leaf, stem, and berry, and the methods used for controlling this disease.

A bibliography of the disease, consisting of some 350 titles, is appended.

The infection of the grape with Plasmopara viticola, H. MÜLLER-THURGAU (*Centbl. Bakt. [etc.], 2. Abt., 29 (1911), No. 23–25, pp. 683–695, fig. 1*).—The results are given of inoculation experiments with the conidia of *P. viticola* on the upper and lower leaf surfaces. In every instance no infection was obtained from inoculating the upper surfaces, while inoculations similar as to time, inoculating material, etc., made on the under side of the leaves were very often successful.

In the small dead areas on the older grape leaves large numbers of oospores were found.

The summer spraying of peaches, J. P. STEWART (*Proc. State Hort. Assoc. Penn., 52 (1911), pp. 181–195, figs. 3; Proc. Amer. Pomol. Soc., 32 (1911), pp. 281–292, pls. 2*).—The results are given of experiments with various fungicides as summer sprays for peach orchards, in which the author notes the meteorological conditions during the experimental period, and the effects of the various sprays on the fruit, foliage, twigs, curculio, scab, brown rot, the carrying quality of the peaches, and on the yield, soundness, and color of the fruit.

The sprays used were as follows: Self-boiled lime-sulphur, 8:8:50, plus 2 lbs. of arsenate of lead; lime-sulphur solution, specific gravity 1.003, plus 2 lbs. of arsenate of lead; lime-sulphur solution, specific gravity 1.003, plus 2 pts. of arsenite of lime solution; lime-sulphur solution, specific gravity 1.003, plus 2 lbs. of arsenate of lead, applied with a carbon dioxid gas sprayer; Sulfocide, 1:400, plus 2 pts. of arsenite of lime solution; Sulfocide, 1:400, plus 2 lbs. of arsenate of lead; Pyrox, 5:50; Bordeaux mixture, ½:6:50 and ¼:6:50, plus 2 lbs. of arsenate of lead. The amount of the arsenicals given in each of the above sprays was added to every 50 gal. of the mixture.

A summary of the spray injuries due to compounds of sulphur and arsenic which developed from the experiments undertaken shows that (1) when used in the proper dilutions most of the injury is due directly to the arsenical but indirectly to the solvent action of the fungicide used with it, (2) that arsenicals containing soda are unsafe with certain lime-sulphur sprays, (3) that the use of spray water containing appreciable quantities of sodium salts or the use of commercial lime-sulphurs to which sodium or potash salts have been added is especially dangerous in connection with arsenicals, and (4) that to avoid lime-sulphur-arsenic spray injury, so far as it depends on the materials themselves, it is necessary to eliminate the solvent action of the fungicide by putting it out of solution, coupling this with the use of an arsenical of the highest grade.

It was found that the fungicidal properties of the lime-sulphur spray were not lost by the precipitation of the sulphur when the spray was applied with the gas sprayer. In the control of curculio the arsenate of lead was not very effective while the arsenite of lime was remarkably so.

Incidentally, the author notes the practical control of curculio on apple trees, even when the first application of the arsenicals was from 10 to 15 days after the petals had fallen and the second some 3½ weeks later.

All of the sprays except one (Sulfocide plus arsenate) increased the yields, and all gave a greater percentage of sound fruit than the unsprayed trees, ranging from as low as 53.1 per cent of sound fruit for the Sulfocide and arsenate sprays to 73.9 per cent for the ½:6:50 Bordeaux mixture as compared with an average on the 2 checks of about 10 per cent of sound fruit, while the lime-sulphur and arsenate mixture applied with the carbon-dioxid gas sprayer gave 73.6 per cent of sound fruit. The effects of the spray on scab and brown rot varied considerably, ranging from 22.8 per cent of scab for the Sulfocide and arsenite to 6.57 per cent for the self-boiled lime sulphur and arsenate and 5.3 per cent for Pyrox, and from 21.7 per cent of rot for the lime-sulphur and arseuate to 7.2 per cent for the ½ : 6 : 50 Bordeaux mixture and arsenate spray as compared with an average of 33.6 per cent of rotted fruit on the check plats.

Bitter plums, P. SORAUER (*Ztschr. Pflanzenkrank., 21 (1911), No. 3, pp. 145, 146*).—Attention is called to the presence of a fungus, *Cephalothecium roseum*, on ripe plums which were offered for sale in the markets of Germany. The affected plums were bitter and had small white spots over their surfaces, from which after about 2 weeks the fruit bodies of the fungus developed.

A thread blight on Para rubber, camphor, etc., K. BANCROFT (*Agr. Bul. Straits and Fed. Malay States, 10 (1911), No. 4, pp. 110–114, pl. 1*).—Attention is called to the recent appearance on Para rubber and camphor trees (*Cinnamomum camphora*) of a disease called thread blight, due to a fungus which apparently belongs to either the genus Hypochnus or the genus Corticium.

The leaves of the attacked trees wither and hang down, often becoming matted into dense masses. The young twigs also wither, the buds die, and finally the leaves are shed. White rhizomorphic strands are found on the affected branches and spread from them to the under sides of the leaves, where they repeatedly branch until the entire under surface of the leaf is covered with a white mass of fine fibrils. No spore-bearing structures have been found, and the fungus is disseminated by infested leaves being blown to other trees where they adhere to the branches or twigs by means of the dense mycelial growth.

The remedies suggested are the collection and burning of all fallen leaves and twigs from diseased trees.

A disease of seedlings of Palaquium oblongifolium, K. BANCROFT (*Agr. Bul. Straits and Fed. Malay States, 10 (1911), No. 4, pp. 108–110*).—The author describes as new *Læstadia palaquii*, a fungus which produces brown spots on the leaves of seedlings of *P. oblongifolium*. These spots increase in size until they often become confluent over nearly the entire area of the leaf, while the remaining portion of the leaf becomes yellow The leaf finally withers and dies, followed by the withering of the young part of the stem, and eventually by the death of the seedling. A description of the fungus is appended.

A root gall of begonias, K. SCHECHNER (*Österr. Gart. Ztg., 6 (1911), No. 5, pp. 161–167, figs. 4*).—A description is given of a root gall of this ornamental plant when grown under glass, due, it is claimed, to attacks of the nematode, *Heterodera radicicola*.

Report of the department of botany, C. BROOKS (*New Hampshire Sta. Bul. 151, pp. 21–23*).—Self-boiled, home-boiled, and commercial lime-sulphur mixtures as fungicides have been tested both alone and in combination with the various insecticides. The lime-sulphur sprays produced no injury to apple trees and controlled the diseases during 1908 and 1909, but experiments made in 1910 indicate that more frequent applications of lime-sulphur mixtures will have to be made than of Bordeaux mixture during rainy seasons, as the sulphur mixtures wash off the trees more readily than the copper sprays. Arsenate of lead and arsenite of lime when combined with lime sulphur gave no injury, while Paris green when used with commercial lime-sulphur produced slight injuries if there was no excess of lime present (E. S. R., 22, p. 747).

Special attention has also been given to leaf spot of apple, apple scab, fruit spot of apple, and tomato diseases.

Recent advances in our knowledge of lime-sulphur, J. P. STEWART (*Proc. State Hort. Assoc. Penn., 52 (1911), pp. 176–181, figs. 2*).—A brief review is given of the development of lime-sulphur as an insectide and fungicide for orchards from its inception on the Pacific Coast to its present prominent position as a scalecide and fungicide. Special attention is given to the work done in recent years by the Pennsylvania Station in determining that the proper ratio of lime to sulphur for concentrated lime-sulphur mixtures is not constant but varies primarily with the increase in density; that for orchard conditions the best ratio of ingredients is 1 lb. of high grade calcium lime to 2 lbs of sulphur; that the sedimentation of concentrated lime-sulphur in storage is due to exposure to the air, and therefore easily remedied by keeping in completely filled air-tight vessels; and that the inauguration of a definite system of dilution in the use of lime-sulphur sprays is advisable.

Notes on a modified soda-Bordeaux mixture, V. VERMOREL and E. DANTONY (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 14, pp. 972–974*).—The authors describe 2 copper-soda sprays, to which soap was added to increase their adhesive or wetting power.

It was found that when 2 kg. of copper sulphate dissolved in 50 liters of water and 2 kg. of carbonate of soda in 50 liters of water were mixed by pouring all of the carbonate of soda solution immediately into the sulphate solution a precipitate was formed without the liberation of carbon dioxid. The resulting mixture finally contained insoluble hydrocarbonate of copper and soluble bicarbonate of copper, which the authors call mixture A. If the carbonate of soda is gradually and slowly poured into the sulphate of copper solution, carbon dioxid is evolved and the mixture finally contains insoluble hydrocarbonate of copper and an excess of carbonate of soda; this is called mixture B.

If to mixture A 1,000 gm. of white soap free from carbonate and alkalis and very rich in oleate of soda is added, the superficial tension of the mixture is such that 5 cc. forms 85 drops as compared to 66 drops formed from 5 cc. of distilled water used as a standard, and this tension does not vary with time. If to mixture B only 100 gm. of the soap is added the mixture will have a superficial tension of 85 drops the same as mixture A, but the tension in B so decreases that at the end of 3 hours it has only 83 drops. When 1,000 gm. of the soap is added to mixture B the tension will be 151 drops immediately after the addition of the soap, 139 drops 20 minutes after, 125 drops 1 hour after, 113 drops 3 hours after, 100 drops 6 hours after, and so on until it reaches the 85 drop limit of mixture A. This increase in the number of droplets increases the wetting power of the spray, and differs according to the manner of the preparation of mixtures A and B and the subsequent action of their superficial tension when the soap is added. This explains, so it is claimed, the divergence of opinion of different investigators as to the value of such sprays.

On the use of Schweinfurt Paris green for controlling plant diseases, T. S. HOFMAN (*Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat. [Netherlands], 1911, No. 9, pp. 26–35*).—On account of a serious foliage injury which occurred to fruit trees from the use of this substance on certain orchards the author investigated the causes of this injury, and reports the results of his investigations.

From microscopical and chemical tests of the Paris green the conclusion is reached that the injury was probably due to the use of spray water containing ammonia or ammonium carbonate which rendered soluble appreciable quantities of the arsenic. It was also found that the copper present in the Paris green was inert and quickly changed to cuprous oxid.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Atlas of zoogeography, J. G. BARTHOLOMEW, W. E. CLARKE, and P. H. GRIMSHAW (*[Edinburgh], 1911, pp. 67+XI, pls. 36, figs. 2*).—The object of this atlas is to delineate and describe, so far as the state of our knowledge permits, the present distribution of the higher animals over the surface of the earth. This undertaking is stated to be based upon the result of original researches into the zoological literature of all countries. All the families of mammals, birds, reptiles, and amphibians, together with several of the more important genera and species, have been dealt with, and in addition most of the families of fishes and a selection of families and genera of molluscs and insects.

The text is divided into 5 parts. In part 1 (pp. 1–3) a short historical account is given of the various systems propounded for the subdivision of the world in zoogeographical regions, wherein the views of the leading authorities are considered; in part 2 (pp. 4–12) the various regions and subregions of Wallace are defined and an account given of their characteristic and peculiar animals, with original tables, giving a numerical summary of the families of terrestrial vertebrates occurring in these areas; part 3 (pp. 13–56), the main portion of the text, is designed to afford concise information regarding the groups of animals the distribution of which is shown on the plates. A census based upon the latest information is given where possible of the number of known species of each family. In part 4 (pp. 57–67) a bibliography is given which contains a list limited to about 1,000 titles of the more important books and papers dealing with the animals of the various regions. The titles are arranged alphabetically under the authors' names, and are then grouped primarily under the regions, and secondarily under the various classes of animals.

The 36 plates embrace a series of 200 colored maps which illustrate the distribution of over 700 families, genera, and species of existing animals. A full and comprehensive index is appended.

The mammals of the tenth edition of Linnæus; an attempt to fix the types of the genera and the exact bases and localities of the species, O. THOMAS (*Proc. Zool. Soc. London, 1911, I, pp. 120–158*).—The author states that in preparing this paper Linnæus's quotations have been verified through reference to the original works.

On the common shrew mole (Scalopus aquaticus machrinus) in Illinois, F. E. WOOD (*Bul. Ill. State Lab. Nat. Hist., 9 (1910), Art. 1, pp. 1–13, figs. 2*).—Anatomical and bionomic studies of the species of shrew mole that occurs in most of Illinois and throughout the eastern half of the United States are presented.

Collections made from different parts of the State indicate a gradual increase in size from east to west, across the State. The investigations indicate but 1 litter a year, which is brought forth the latter part of April or early in May.

In Illinois the chief complaint against moles has been that they destroy recently-planted corn, in some cases it being said that 25 per cent of the first planting has been destroyed. The author finds that moles work in corn fields all summer and fall but the damage is practically all done within the first 10 days after planting. Experiments conducted during the season of 1908 with repellents in which seed corn was treated with kerosene, carbolic acid, formalin, oil of lemon, and other vegetable oils, failed to give definite results, except in cases where the quantity used was so great as to injure the seed.

Studies upon plague in ground squirrels, G. W. McCOY (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Bul. 43, 1911, pp. 7–51*).—These studies are reported in 4 parts under the headings, (1) pathology and bacteriology of plague in ground squirrels, (2) notes on induced plague in ground squirrels, (3) immunity of certain squirrels to plague infection, and (4) insect transmission in relation to plague among ground squirrels.

Food of the woodpeckers of the United States, F. E. L. BEAL (*U. S. Dept. Agr., Bur. Biol. Survey Bul. 37, pp. 64, pls. 6, figs. 3*).—This bulletin describes the food habits of 16 important species of woodpeckers, and points out the extent to which each is beneficial or injurious. While most woodpeckers are highly beneficial, the sapsuckers are injurious, since they subsist to a considerable extent on the cambium or inner bark of trees.

Index-catalogue of medical and veterinary zoology, C. W. STILES and A. HASSALL (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 39, pt. 34, pp. IV+2583–2654*).—This part lists the literature by authors from Werlhof to Xémard.

Forty-first annual report of the Entomological Society of Ontario, 1910 (*Ann. Rpt. Ent. Soc. Ontario, 41 (1910), pp. 124, pls. 3, figs. 23*).—Among the papers of economic importance presented in this report are accounts of the occurrence of insects during the year, by A. Gibson, L. Caesar, C. G. Hewitt, T. W. Fyles, and others; the seed corn or bean maggot (*Pegomyia fusciceps*) in Ontario in 1910, by J. E. Howitt; the horse-radish flea beetle (*Phyllotreta armoraciæ*), by A. F. Winn; the migration of some native locusts, by N. Criddle; some observations on the practical importance of the study of parasitic insects, by C. G. Hewitt; the Coccidæ of Canada and the Aleyrodidæ of Ontario, by T. D. Jarvis; some insects of the larch and insect notes from Ste. Anne's, by J. M. Swaine; and basswood or linden insects, by A. Gibson.

Second report of the state entomologist, C. P. GILLETTE (*Ann. Rpt. Bd. Hort. Colo., 1910, pp. 167–191, pls. 2*).—This is a detailed report of the horticultural inspection work for the year 1910.

Report of the entomologist, D. T. FULLAWAY (*Hawaii Sta. Rpt. 1910, pp. 19–24*).—An account of the occurrence of injurious insects during the year.

On one plantation pineapple plants were badly damaged in the fall by an introduced locustid (*Xiphidium varipenne*) which attacked the leaves, making large abrasions that permitted the entrance of fungi and caused the leaves to wilt and die back. The eggs of this locustid are highly parasitized, however, and it is not likely to become a serious pest. The edible nuts of the litchi tree in several Honolulu gardens were badly attacked in July by a tortricid moth (*Cryptophlebia illepida*), the larvæ of which bore into the succulent fruit and render it unfit for use. In one orchard the entire crop was destroyed.

A brief report is made on introductions of parasites of the algaroba weevil in cooperation with the Bureau of Entomology of this Department. Lists are given of the insects that attacked corn, wheat, barley, jack bean, and cotton.

Report of the department of entomology, W. C. O'KANE (*New Hampshire Sta. Bul. 151, pp. 39–46*).—This is a report of the department for the biennial period ended October 30, 1910.

One of the principal investigations was that of the apple maggot or railroad worm, of which a brief summary of the results obtained to date is here presented. The author states that 95 per cent of the orchards of the State were found to be more or less infested by this pest. Seventy-one varieties have thus far been studied to determine their susceptibility to attack, and certain varieties found especially susceptible, others only occasionally infested, and 1 or 2 varieties practically immune. Studies of apples in cold storage show that as a rule deterioration is more rapid in the case of infested fruit.

The author finds that the first eggs are laid soon after the flies begin to emerge, about July 2 to 5, and that egg-lying continues through July and August, and probably into September. It is stated that this is true regardless of variety, except that the eggs are not laid in early apples after they have ripened and dropped from the tree. It was found that where winter fruit such as the Baldwin becomes infested, the early drops falling in August may easily become sufficiently mellow to permit the maggots to mature. On the other hand badly infested Baldwins gathered early in October failed to mature a single maggot and the same was found to be true of russets. Thus in the case of winter varieties, it is the early drops that should be disposed of in order to destroy the maggots.

In investigations made to determine how soon after dropping the maggots leave the apples, "it was found that in the case of such varieties as the August Sweet or the Early Harvest some maggots began to emerge within 36 hours, though they did not come out in large numbers until 3 or 4 days had elapsed since the apple fell from the tree. With varieties such as the Gravenstein a week elapsed before the maggots began issuing in any considerable numbers. In the case of winter fruit, such as the Westfield, practically no maggots emerged until after the apples had been off the tree from 2 to 4 weeks." In the case of fall fruit it is thought to be sufficient if the drops are cleaned up twice a week, while with the winter fruit the same results will be obtained by cleaning up once in 2 weeks. The author finds that there is nothing to indicate that the adult flies normally travel any great distance.

Experiments indicate that it is not possible to bury the pupæ so deep by plowing that the flies will be unable to reach the surface, thus corroborating the observations made at the Rhode Island Station (E. S. R., 16, p. 794). The author reports that by spraying with sweetened arsenical, practically perfect fruit were obtained from an August Sweet tree which during previous years yielded worthless fruit only.

The author reports that during the season of 1910 there was an almost complete cessation of the abnormal numbers of the antlered maple worm (*Heterocampa guttivitta*) (E. S. R., 21, p. 759). Specimens were observed at various points but they did not appear in sufficient numbers to cause injury.

Brief notes are also given on experiments in the control of the black fly (E. S. R., 23, p. 359).

Sixth annual report of the state entomologist and plant pathologist for 1910, G. M. Bentley (*Bien. Rpt. Tenn. Dept. Agr., 1909–10, pp. 19–69, pls. 19, fig. 1*).—This report includes an account of the periodical cicada (*Cicada tredecim*) in Tennessee in 1911, notes on the important insects that occurred during the year, the laws and regulations relating to nursery inspection, etc.

[Reports of the entomologist and assistant entomologist], F. W. Urich and P. L. Guppy (*Bd. Agr. Trinidad Circ. 2, 1911, pt. 1, pp. 5–11*).—In these brief reports of the work of the year mention is made of the occurrence of sugar-cane, cacao, coconut-palm, and other insects.

Insect pests in 1910, R. S. MacDougall (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 147–151*).—The author found during the year that the black-blue fly (*Protocalliphora grœnlandica*) attacks live sheep and that its maggots, like those of *Lucilia sericata* and *Calliphora erythrocephala*, are the source of injury to sheep in Scotland. *Dermestes vulpinus* was found to riddle completely with holes recently placed wooden beams in a guano factory. Notes are also presented on the occurrence of the large larch sawfly (*Nematus erichsoni*), the raspberry beetle (*Byturus tomentosus*), and the raspberry moth (*Lampronia rubiella*).

Some local insects of economic importance, A. F. Navarro (*Philippine Agr. and Forester, 1 (1911), No. 2, pp. 32–35*).—Notes are presented on a number of insects of economic importance at Los Baños, P. I., namely, the corn-moth borer (*Pyrausta vastatrix*), the banana leaf roller (*Erionota thrax*), the ilang-ilang moth (*Attacus atlas lorquinii*), the gabi moth (*Chærocampa celerio*), a nymphalid (*Anosia chrysippus*), the red cotton bug (*Dysdercus cingulatus*), the rice army worm (*Spodoptera mauritia*), a pierid (*Catopsila pyranthe*), and an aganaid (*Asota philippina*).

[Control of citrus insects], J. E. Higgins (*Hawaii Sta. Rpt. 1910, pp. 35, 36*).—The author finds fumigation with hydrocyanic-acid gas to be the most effective means experimented with in controlling the mealy bug (*Pseudococcus filamentosus*). Reinfestation takes place more rapidly than in the case of the Florida red scale (*Chrysomphalus aonidum*) and the purple scale.

[Two insect pests of the avocado], J. E. HIGGINS (*Hawaii Sta. Rpt. 1910, pp. 26, 27*).—The avocado mealy bug (*Pseudococcus nipæ*) and the larva of the tortricid moth *Amorbia emigratella* were the 2 chief insect pests of avocado in the station orchard during the year, the latter causing considerable damage to foliage in the orchard and to the fruit in gardens of the city. Frequent sprayings with arsenate of lead considerably reduced their numbers.

Five important grape insects and their repression, F. H. HALL (*New York State Sta. Bul. 331, popular ed., pp. 3–16, figs. 10*).—A popular edition of Bulletin 331, previously noted (E. S. R., 24, p. 751).

[Insect enemies of the mango], J. E. HIGGINS (*Hawaii Sta. Rpt. 1910, p. 31*).—The author reports having found it necessary to fumigate trees in the mango orchard for the destruction of *Phenacaspis eugeniæ* and for the Florida red scale (*Chrysomphalus aonidum*). A red-banded thrips (*Heliothrips rubrocinctus*) caused serious damage to young mango seedlings in the greenhouse, but was controlled by dusting the plants with finely powdered sulphur after they had been sprayed with water. *Amorbia emigratella* also proved destructive to mango flowers and to some degree to the young leaves.

The large carpenter bee (*Xylocopa æneipennis*) did considerable damage to young mango buds. "The bee seems to find an inviting place for boring just above the bud on the bud shield, and in many instances bored through the shield into the old wood of the stock, causing injury and sometimes destruction to the bud. It has been found easy to control this injury by placing grafting wax in all the incisions, leaving only the bud and a small portion of the shield exposed. This should be done when the bandage is removed, if injury of this kind is experienced."

Insect enemies of the pecan, F. H. CHITTENDEN (*Nut Grower, 10 (1911), Nos. 3, pp. 40–43; 4, pp. 61–63, 65, 66, figs. 6*) —Some of the more important insect enemies of the pecan are here considered.

Cattle in Central America, J. E. DOWNING (*Breeder's Gaz., 58 (1910), No. 19, pp. 961, 962, figs. 4*).—During the course of this account the author states that in Honduras, because of the screw worm, wild beasts, neglect, and exposure, but 15 per cent of the calves reach maturity. Mention is made of injury by the so-called cattle spider. "This spider seeks the hair of the fetlock for lining its nest, and as the beast moves at feeling the removal of the hair, the spider becomes enraged and bites the flesh just above the hoof on the pastern and creates an inflamed condition of the skin which results in the loss of the hoof."

Termite life in Ceylon, K. ESCHERICH (*Termitenleben auf Ceylon. Jena, 1911, pp. XXXII+262, pls. 3, figs. 68; rev. in Science, n. ser., 33 (1911), No. 849, pp. 530–534*).—A bionomical study of white ants, based on observations made during a trip of several months to Ceylon, is presented.

The first chapter (pp. 1–97) is devoted to the nests of the mound-making termite, including fungus gardens, termitophiles, etc.; the second (pp 98–134) to the habits of the species of Eutermes; the third (pp. 135–161) to miscellaneous observations and laboratory experiments; and the fourth (pp. 162–179) to economic considerations.

Extermination measures recommended are (1) the stopping of some of the main openings of the nest with tow or waste soaked with carbon bisulphid and closing the remaining openings with clay or earth, and (2) the use of an ant-exterminator machine. A description is given of a "Termitensucher," an apparatus used in locating the termites. It "consists of a microphone inserted in a funnel at the end of a steel tube and connected with a telephone receiver. When the tube is stuck into the earth the noise made by the crawling termites can be distinctly heard through the receiver even when they are working at a considerable depth in the soil. By means of this apparatus termites may be readily located in the tree trunks of orchards or estates or in the walls of houses and marked for treatment with the arsenic-sulphur fumes," generated in the exterminator apparatus.

The work closes (pp. 185–252) with a series of appendixes by various authors who have studied the material collected in Ceylon. The review is by W. M. Wheeler.

Studies of Mallophaga and Anoplura, E. Mjöberg (*Ark. Zool., 6 (1910), No. 13, pp. 296, pls. 5, figs. 156*).—This work on the morphology and classification of the biting and sucking lice includes descriptions of new genera and species. A host index and bibliography of 14 pages are appended.

Experiments with cotton stainers, W. Robson (*Agr. News [Barbados], 10 (1911), No. 235, p. 138*).—"Practically no effect on germination was produced by the feeding of the stainers on seed which had been protected during growth, and exposed to the feeding only after being harvested, while the seed which was produced in bolls attacked during growth showed a very small relative germinating power. . . . The lint was affected to a very serious extent where the stainers were abundant during the development of the cotton."

The white fly (Aleyrodes citri), F. W. Mally (*Texas Dept. Agr. Bul., n. ser., 1910, No. 6, pp. 14*).—A brief summarized account is given, with directions for the preparation and use of insecticides.

The Aphididæ of the vicinity of Hermannstadt, C. Henrich (*Verhandl. u. Mitt. Siebenbürg. Ver. Naturw. Hermannstadt, 59 (1909), pp. 1–104*).—This work on German Aphididæ includes host and species indexes.

Danger of general spread of the gipsy and brown-tail moths through imported nursery stock, C. L. Marlatt (*U. S. Dept. Agr., Farmers' Bul. 453, pp. 22, figs. 7*).—This bulletin gives a record of the infested importations of nursery stock during the last 2 years, describes nursery conditions in Europe showing the nature of the infestation there, and concludes with a brief description and illustrations of the 2 moth pests which are now being thus imported. Descriptions and figures are included as an aid to a prompt recognition of the pests.

A new species of Lasioptera with observations on certain homologies, E. P. Felt (*Psyche, 18 (1911), No. 2, pp. 84–86*).—The gall midge here considered, *L. portulacæ*, n. sp., was reared from stem galls on purslane (*Portulaca oleraceæ*) at St. Vincent, West Indies.

Some facts about malaria, L. O. Howard (*U. S. Dept. Agr., Farmers' Bul. 450, pp. 13, figs. 6*).—In this publication, which has been prepared to meet a strong demand for information on the subject by persons connected with agricultural pursuits in various parts of the country, the author considers the nature of the disease, its conveyance by mosquitoes, the mosquitoes concerned, and preventive and curative measures.

Remedies and preventives against mosquitoes, L. O. Howard (*U. S. Dept. Agr., Farmers' Bul. 444, pp. 15*).—This popular account is largely a condensation of the more important of the matter issued in Bulletin 88 of the Bureau of Entomology, previously noted (E. S. R., 24, p. 458).

Food habits of Megarhinus, F. Knab (*Psyche, 18 (1911), No. 2, pp. 80–82*).—The structure of the female proboscis of Megarhinus and personal observations of *M. septentrionalis* and *M. superbus* lead the author to conclude that the mosquitoes of this genus feed wholly upon sweets of flowers. While all the parts of the proboscis found in the females of the blood-sucking species are present in Megarhinus, the sheath or labium is strongly chitinized and rigid, which is not the case with the blood-sucking forms.

The papataci flies (Phlebotomus) of the Maltese Islands, R. NEWSTEAD (*Bul. Ent. Research, 2 (1911), No. 1, pp. 47–78, pls. 3, figs. 19*).—In this report of investigations conducted by the author during a 2 months' trip to the island of Malta, he discusses the habits and occurrence of the adult flies, breeding places, seasonal prevalence, prophylactic measures, etc., also the classification of the genus Phlebotomus. Two species are described as new to science.

Preliminary report on the life histories of 2 species of Syrphidæ, C. L. METCALF (*Ohio Nat., 11 (1911), No. 7, pp. 337–344, pls. 2*).—Studies on the life history of *Didea fuscipes* and *Syrphus torvus* are here reported, together with technical descriptions of the larval, pupal, and adult stages.

"The larvæ of *D. fuscipes* live in the colonies of the large aphid, *Longistigma* (*Lachnus*) *caryæ* which appear so abundantly in fall on the under sides of the lower horizontal branches of the sycamore (*Platanus occidentalis*). I have also found the larvæ on a basswood tree (*Tilia americana*) affected with these plant lice. They are apparently closely restricted in food habits to the body fluids of this one kind of aphid and may be expected wherever *L. caryæ* occurs with any regularity."

The autumn generation of larvæ of *S. torvus* appears on cabbage affected by plant lice, usually during the latter half of September, becoming abundant from the first to the middle of October. The food of the larvæ usually consists of the body juices of the cabbage plant louse (*Aphis brassicæ*). The author has also found the larvæ of this species on sycamore, feeding on *L. caryæ*.

The house fly, disease carrier, L. O. HOWARD (*New York, 1911, pp. XIX+312, pls. 28*).—The main part of this work consists of 5 chapters devoted respectively to the zoological position, life history, and habits of the typhoid fly; its natural enemies; the carriage of disease by flies; remedies and preventive measures; and other flies frequenting houses. The work concludes with a bibliographical list of 12 pages and 5 appendixes.

Transmission of tuberculosis by flies, P. JACOB and M. KLOPSTOCK (*Tuberculosis, 9 (1910), No. 11, pp. 496–510, figs. 2; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1911), No. 3, p. 125*).—The authors discuss the relation of flies to the transmission of tuberculosis, particularly from animal to man, in rural districts. As a preventive for this they recommend a thorough disinfection of the barns, stables, etc.

Lucilia sericata as a household pest, A. P. MORSE (*Psyche, 18 (1911), No. 2, pp. 89–92, fig. 1*).—Flies, which developed in a dead squirrel in a chimney, gained entrance through a fireplace and were the source of great annoyance for a period of several weeks.

The parasites of the olive fly in Tunis, P. MARCHAL (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 4, pp. 215–218, figs. 3*).—During the course of studies in Tunis the author found 2 chalcidid (*Eulophus pectinicornis* and *Eupelmus urozonus*) and a braconid (*Opius concolor*) parasites of the olive fly, *Dacus oleæ*. The chalcidid parasites occur in southern Europe but the braconid, which plays an important part in checking the multiplication of the olive fly, is recorded for the first time as a parasite of this pest and is also the first internal parasite of the olive fly to be discovered. Attempts are being made to establish this parasite in Europe.

The destruction of fleas by exposure to the sun, J. CUNNINGHAM (*Sci. Mem. Med. and Sanit. Depts. India, n. ser., 1911, No. 40, pp. 27, figs. 3*).—The experiments here reported have led the author to the following conclusions:

"The pulicidal power of the sun appears to be chiefly due to the amount of heat which it gives off. The fate of the fleas, which escape from clothes exposed to the sun, depends on the nature of the ground upon which the clothes are spread. On hard ground, and more especially on sand, the fleas are all destroyed; on grass they will in all probability be able to find shelter and therefore escape. The time of exposure necessary to destroy all the fleas is about 45 minutes when the clothes are spread on hard ground, and is probably somewhat less when sand is employed."

The experiments show that "the temperatures between 95 and 112° are not strong enough to destroy all the fleas, although there is a great diminution in their numbers in the 2 last experiments which registered 112°. From 116° upwards all the fleas were killed. The minimum temperature, therefore, lies between 112 and 116°, probably 116° itself, because in 2 experiments which were carried out by gradually heating a test tube containing fleas by immersion in warm water, it was found that the exact temperature at which they were killed was 116.4° on the first occasion and 118.4° on the second. If we add 4° to this result, which has been obtained experimentally, and call the minimum 120°, we may be certain of obtaining a temperature which will be fatal under the most practical conditions."

Two species of cysticercoids from the rat flea (Ceratophyllus fasciatus), W. NICOLL and E. A. MINCHIN (*Proc. Zool. Soc. London, 1911, I, pp. 9–13, figs. 2*).—Much of the data here presented relating to the occurrence of *Hymenolepis diminuta* in the rat flea has been previously noted from another source (E. S. R., 25, p. 158).

Experiments in which rats were fed daily with fleas mashed up in their food demonstrate that the complete development of *H. diminuta* may take place in less than 3 weeks. A single specimen of a second cysticercoid, thought to be *H. murina*, was met with in the body cavity of a male *C. fasciatus.*

The mechanism of transmission of Trypanosoma lewisi from rat to rat by the rat flea, C. STRICKLAND (*Brit. Med. Jour., 1911, No. 2627, p. 1049*).—"Infection of rats with *T. lewisi* is caused by the rats' act of eating infective fleas. It is not caused by contamination of the rats during a short time, nor by their being bitten by the fleas. Many more fleas are infective than cause infection in nature. The infective form of the trypanosome, which is probably the 'small trypanosome' of Swellengrebel and Strickland, must reach the blood through the gut wall. It is possible that other trypanosomiases may be transmitted by perhaps even nonblood-sucking creatures."

Bees, E. F. PHILLIPS (*U. S. Dept. Agr., Farmers' Bul. 447, pp. 48, figs. 25*).—This supersedes Farmers' Bulletin 397 (E. S. R., 23, p. 365) and gives briefly such information as is needed by persons engaged in the keeping of bees.

The honey bee in Vermont, H. W. BEECHER (*Vt. Agr. Bul. 6, 1910, pp. 29, fig. 1*).—This bulletin discusses the history of bee keeping and of bee-keepers' organizations in Vermont, the present extent of the industry in the State, wintering, commercial aspects, the value of honey as a food, sources of honey, bee diseases and enemies, etc.

The treatment of bee diseases, E. F. PHILLPS (*U. S. Dept. Agr., Farmers' Bul. 442, pp. 22, figs. 7*).—This bulletin supersedes Circular 70 of the Bureau of Entomology, previously noted (E. S. R., 18, p. 561). It gives briefly the information needed by the beekeeper who has disease in his apiary.

Biological notes on Pimpla pomorum, MOKRZECKI (*Ztschr. Wiss. Insektenbiol., 7 (1911), No. 2, pp. 63, 64, figs. 3*).—The author reports having found this ichneumon to parasitize as high as 75 per cent of the apple blossom weevils (*Anthonomus pomorum*) in orchards in Crimea.

Gametogenesis of the gall fly, Neuroterus lenticularis, II, L. DONCASTER (*Proc. Roy. Soc. [London], Ser. B., 83 (1911), No. B 566, pp. 476–489, pl. 1*).—A continuation of studies previously noted (E. S. R., 24, p. 662).

Some parasites of Lasius fuliginosus, L. niger, and L. flavus, W. C. Crawley (*Ent. Rec. and Jour. Variation, 23* (*1911*), *No. 1, pp. 22, 23*).—The occurrence of *Antennophorus grandis*, as a parasite of ant larvæ, is reported. In one nest as high as 12 per cent of the ants were found to be infested by this mite.

A new sawfly of economic importance, S. A. Rohwer (*Ent. News, 22* (*1911*), *No. 6, pp. 263–265, figs. 6*).—*Caliroa* (*Eriocampoides*) *amygdalina* which has been found to defoliate peaches in the vicinity of Tallulah, La., is described as new to science.

Technical papers on miscellaneous forest insects.—IV, Studies in the sawfly genus Hoplocampa, S. A. Rohwer (*U. S. Dept. Agr., Bur. Ent. Bul. 20, pt. 4, tech. ser., pp. 139–148, pls. 4, fig. 1*).—This second paper on sawflies (E. S. R., 24, p. 662) includes descriptions of 10 new species of Hoplocampa. A synoptic table of the Nearctic species of the subgenus Hoplocampa is included.

An insect injurious to spruce trees, A. H. Cockayne (*Jour. New Zeal. Dept. Agr., 2* (*1911*), *No. 3, pp. 117–121, figs. 2*).—A species of red spider closely related to *Tetranychus bimaculatus* is reported to have become the source of considerable injury to various species of Abies, especially *A. menziesii*, in the South Canterbury district of New Zealand. Infestation is first manifested by a yellowing of the leaves of young branches. The leaves soon become dry and fall off.

The Colorado laws governing horticultural inspection (*Ann. Rpt. Bd. Hort. Colo., 1910, pp. 217–228*).—The regulations and insecticide and fungicide formulas adopted by the State Board of Horticulture are presented with the laws governing horticultural inspection.

A contribution to our knowledge of insecticides, C. T. McClintock, E. M. Houghton, and H. C. Hamilton (*Rpt. Mich. Acad. Sci., 10* (*1908*), *pp. 197–208, pl. 1; reprint*).—"The work reported in this paper has to do with the contact insecticides only. . . .

"The insecticidal, germicidal, and toxic values (for higher animals) have little or no correlation. It is possible to determine the relative strength or value of insecticides by immersing test insects in definite strengths of the insecticide, and noting the time required to produce death. The common bedbug (*Cimex lectularis*) appears to be the most satisfactory test insect. As yet the mode of action, the way in which the contact insecticides cause the death of the insects, has not been determined. Apparently the fewer the number of spiracles, the smaller their size, and the better they are guarded by hairs or valves, the more resistant is the insect to the contact insecticides.

"Chemical standardization of this class of insecticides is with our present knowledge impossible. With 2 substances, having essentially the same chemical composition, the insecticidal values may vary enormously. Even the same substance, prepared with what are apparently unimportant chemical variations, gives widely different insecticidal values."

A further contribution to our knowledge of insecticides, C. T. McClintock, H. C. Hamilton, and F. B. Lowe (*Jour. Amer. Pub. Health Assoc., 1* (*1911*), *No. 4, pp. 227–238, pl. 1*).—"It is possible to standardize substances which are subject to sophistication or deterioration by comparing the efficient dilution of their vapors with that of a product of known purity. This is particularly applicable to solutions of nicotin and to powdered chrysanthemum flowers. As yet there is nothing from which to conclude what action the vapors have on the insects. If it were merely irritative, formaldehyde would be valuable and the vapors of burning insect powder without value. If the action were similar to anesthesia, chloroform should have been of greater value. If the action were purely that of poisoning one would have expected the highly poisonous hydrocyanic-acid gas to be of exceptional value for all species of insects."

Hydrocyanic-acid gas fumigation in California.—Fumigation of citrus trees, R. S. Woglum (*U. S. Dept. Agr., Bur. Ent. Bul. 90, pt. 1, pp. IX+81, pls. 8, figs. 12*).—The author presents a succinct account of the completed results of fumigation investigations with a brief discussion of the salient features of fumigation as practiced in California at the present time. "It is of the nature of a handbook on the most up-to-date equipment, methods, and directions in orchard fumigation. Full advantage has been taken of the results of other investigators in fumigation; yet in such cases due credit is given to the proper source. The information given in Bulletin 79 of this Bureau [E. S. R., 21, p. 354], which is a preliminary report on this investigation, has been largely included in the present bulletin in summarized form."

Hydrocyanic-acid gas fumigation in California.—The value of sodium cyanid for fumigation purposes, R. S. Woglum (*U. S. Dept. Agr., Bur. Ent. Bul. 90, pt. 2, pp. 83–90, pls. 2*).—This paper records the results secured with sodium cyanid during an investigation of the use of hydrocyanic-acid gas for fumigation of citrus trees in California and is supplementary to the extended report on the use of potassium cyanid above noted. A preliminary account by the author has been previously noted (E. S. R., 23, p. 367).

The author here discusses the proportion of chemicals to use, field tests, the action of sodium chlorid, the kind of cyanid to purchase, dosages with sodium cyanid including charts for field use, dosages recommended for scale pests, and a comparison of sodium cyanid and potassium cyanid for general fumigation.

"From the results of field work in this investigation it has been found that the use of a high grade, or almost chemically pure, sodium cyanid produced exactly as perfect a generation of gas in all cases as the use of a similar grade of potassium cyanid; in the majority of cases where used the generation was apparently superior to that from a potassium cyanid."

Preliminary report on the killing of rats and rat fleas by hydrocyanic-acid gas, W. D. H. Stevenson (*Sci. Mem. Med. and Sanit. Depts. India, n. ser., 1910, No. 38, pp. 28*).—A general discussion of the subject, in which the literature is reviewed, is followed by brief reports of 12 tests conducted.

A fungicide and insecticide blower, E. Zacharewicz (*Prog. Agr. et. Vit. (Ed. l'Est-Centre), 32 (1911), No. 18, pp. 556–559, figs. 6*).—The author figures and describes an instrument to be used in applying powdered insecticides and fungicides on a large scale to grain and field crops by means of horse power.

Analysis of Paris green, 1910, J. W. Kellogg (*Penn. Dept. Agr. Bul. 204, 1911, pp. 33*).—In 416 samples of Paris green analyzed, the arsenious oxid in combination with copper was found to vary from 49.47 per cent to 57.68 per cent, with an average of 55.10 per cent. Only 2 samples were found to contain less than 50 per cent, the required amount of this form of arsenic.

"The amount of water soluble arsenious oxid found present in the samples analyzed varied from 0.72 per cent to 3.45 per cent, with an average of 1.32 per cent. None of the green examined was found to contain water-soluble arsenic in excess of the amount restricted by law. The results obtained in determining the total content of arsenious oxid showed the lowest percentage to be 51.60, the highest percentage to be 61.2, with an average of 56.61 per cent. The amount of copper, expressed as copper oxid, which was determined in the samples received, was found to range from 26.75 per cent to 30.93 per cent, with an average of 29.55 per cent."

FOODS—HUMAN NUTRITION.

The milling value of water-soaked wheat, G. A. OLSON (*Amer. Food Jour., 6 (1911), No. 4, pp. 36–39, figs. 4*).—The effect of soaking and germination on the distribution and yield of milling products, the quality of flour, and bread-making properties was studied.

According to the author's conclusions, "wheat which has been allowed to sprout loses in weight as the length of the time allowed for germination advances.

"The milling value of germinated wheat decreases as the length of the epicotyl increases.

"The length of time required for the conversion of starch decreases as the length of the epicotyl increases to at least twice the length of the kernel."

It was found that the amount of gluten recovered in flour from germinated wheat was less than that from ungerminated grain. The yield of gluten decreased rapidly as the epicotyl increased in length.

"Expressed in percentage of total nitrogen, the alcohol-soluble nitrogen has not been affected by the germination of wheat. The most marked changes were observed in the glutenin and amid nitrogen. In the former there was a sudden decrease in amount from the period where the epicotyl was equal to the length of the kernel to that where the epicotyl was equal to twice the length of the kernel. The amid nitrogen increased rapidly from the time when the epicotyl was equal to the length of the kernel.

"Using germinated wheat flour, only the quality of the crumb of the bread was impaired, being particularly noticeable in flours made from germinated wheat where the epicotyl was equal to and twice the length of the kernel. The volume of the loaf increased, being of exceptionally large capacity in the bread made from partially germinated wheat flour.

"Using small quantities of germinated wheat flour with other flour it was found that the volume of the loaf could be increased without impairing the texture of the loaf. Each particular flour requires a different amount of germinated flour in order to produce the best results. Too large an amount of diastatic flour is less beneficial than none.

"A water-soaked wheat is not necessarily spoiled and can be used for milling purposes, providing it has been thoroughly cleaned and dried."

On the chemical changes produced in flour by bleaching, G. W. MONIER-WILLIAMS (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Subjs., n. ser., 1911, No. 49, pp. 34–65, dgms. 6; rev. in Brit. Med. Jour., 1911, No. 2624, pp. 881, 882*).—Experimental studies were made on the effects of bleaching flour with different quantities of nitrous oxid gas. Especial attention was paid to experimental methods, to the characteristics of the oil from bleached and unbleached flour, to the influence of bleaching upon digestion, and related matters. The nitrous oxid used was prepared in the laboratory.

Air containing nitrogen peroxid in quantities up to 300 cc. per kilogram of flour affects flour in ways which the author summarizes as follows:

"The golden-yellow tint of the flour is destroyed. Immediately after bleaching no difference in tint due to excess of the bleaching agent could be observed with Lovibond's tintometer, but on keeping for several days the more highly bleached samples became decidedly yellow, while those treated with 30 to 100 cc. of nitrogen peroxid per kilogram became still whiter, the maximum of bleaching effect being attained within these limits.

"The amount of nitrous acid or nitrites present in a freshly bleached flour is approximately proportional to the amount of nitrogen peroxid employed, and corresponds to about 30 per cent of the total nitrogen absorbed, rising to 40 per cent in the more highly bleached samples. After the lapse of several days, the proportion of nitrites present decreases considerably in the higher concentrations, but remains very nearly the same in the more slightly bleached samples.

"Approximately 60 per cent of the total nitrogen introduced as nitrogen peroxid into the flour during bleaching can be recovered as ammonia a short time after bleaching by reducing the aqueous extract of the flour with a copper-zinc couple, and may be assumed to be present in the flour as nitric and nitrous acids or as nitrates and nitrites. After keeping the bleached flour for some days the amount of nitric acid extracted with cold water decreases. Experiments with pure glutenin and gliadin indicated that in certain circumstances nitric acid may be withdrawn from solution or 'absorbed' by these proteins.

"In highly bleached flour a considerable increase in the amounts of soluble proteins and soluble carbohydrates takes place. If 1 kg. of flour is bleached with 300 cc. of nitrogen peroxid, the amount of soluble nitrogen is doubled. This appears to be due almost entirely to the solubility of gliadin in nitric acid of certain concentrations. The simultaneous increase of soluble carbohydrates would seem to point to an intimate relationship between the gliadin and certain carbohydrates in flour.

"If highly bleached flour is allowed to stand for some time after bleaching, the oil undergoes very considerable alteration and acquires the characteristics of an oxidized oil. About 6 to 7 per cent of the nitrogen introduced as nitrogen peroxid during bleaching is absorbed by the oil.

"The absorption of nitrogen peroxid by flour does not appear to be accompanied by the production of free nitrogen, nor was any evidence obtained of the formation of diazo-compounds.

"Sodium nitrite was found to exert no inhibitory action on the digestion of soluble starch by saliva, but the rate of digestion was greatly retarded if the starch had been previously treated with nitrogen peroxid gas. Bleaching was found to exercise an inhibitory effect on the salivary digestion of flour."

A report by Harden is appended, On Certain Experiments in Relation to Bleached Flour carried out at the Lister Institute, in which samples bleached by a commercial electrical process were used as well as overbleached samples prepared in the laboratory. The data regarding the amount of nitrite-reacting material in overbleached flours show "that the sodium nitrite content of overbleached flour varies very considerably with the time. It would appear probable that the nitrous gases first of all dissolve in the water of the flour and then gradually undergo a change which destroys their nitrite-reacting power."

In grossly overbleached flours the amount found was considerably less than that present in flours "treated with much less NO_2, and indicates that some different or more intense reaction occurs under the conditions of the preparation of this sample [of grossly overbleached flour]."

In tests for the presence of nitrogen in diazo-form no definite evolution of gas could be observed.

"It was found very difficult to remove all the air from the flour and the results were therefore not very accurate. They show, however, conclusively that no considerable proportion of the nitrous gas goes to form diazo-compounds capable of being decomposed with evolution of nitrogen by boiling hydrochloric acid. The equivalent of sodium nitrite present in the flour at the time of the experiment was 22.8 parts per million, so that the nitrogen obtainable by the action of the corresponding nitrous acid on the proteins of the flour for a quantity of 20 gm. would be 0.15 cc."

In artificial digestion experiments it was found that overbleached flours underwent a slightly greater degree of tryptic digestion than unbleached flour.

"It may be concluded from these results that the bleaching of flour does not in any degree diminish the readiness with which it undergoes tryptic digestion in vitro."

As regards peptic digestion, the author's results "show a decided, although small, inhibition in the digestion of the bleached samples, the numbers given by these in 4 hours being decidedly less than those of the unbleached. At the expiration of 22 hours this difference had disappeared."

The author's experiments, which have to do with the rapidity of digestion, confirm the observation that "the gluten of unbleached flour is much the more rapidly dissolved. . . . In view of the results obtained with flour with which the rates of solution are only slightly different, it would seem that the effect is due rather to some change produced in the physical properties of the gluten obtainable from the flour than to the formation of a less readily digested compound."

Experiments were also made in which overbleached flour and aqueous extracts of grossly overbleached flour and of commercially bleached flour were administered to small animals (rabbits and a cat).

The results showed that "the extract from commercially bleached flour, from overbleached flour, and even that from grossly overbleached flour is apparently harmless to animals under the above conditions."

A list of references follows the paper, and a quotation in full of U. S. Department of Agriculture Food Inspection Decision No. 100 (E. S R., 20, p. 863).

On the bleaching of flour and the addition of so-called "improvers" to flour, J. M. Hamill (*Rpts. Local Govt. Bd. [Gt. Brit.], Pub. Health and Med. Subjs., n. ser., 1911, No. 49, pp. 1–33; rev. in Brit. Med. Jour., 1911, No. 2624, pp. 881, 882*).—In this digest of data, which includes the author's own laboratory work and personal observations in mills and bakeries, as well as the reports of other investigators, the source of supply of wheat and flour, milling and grading, factors which determine quality, bleaching processes, their effects, the addition of so-called "improvers" in flour, and similar matters are considered.

The general conclusions reached are unfavorable to bleaching and to the use of so-called "improvers."

"The alterations in and the additions to flour which result from a high degree of bleaching by nitrogen peroxid can not be regarded as free from risk to the consumer, especially when regard is had to the inhibitory effect of the bleaching agent on digestive processes and enzyms. Even in the case of flour which is bleached to the small extent which is at present ordinarily practiced, it would in present knowledge be unwise to conclude that the process is attended by absolute freedom from risk. The fact that bleached flour has been shown to be something more than natural flour, the color of which has been modified, is also of importance in considering whether bleached flour may properly be represented as genuine flour. . . .

"With regard to other substances which have been represented as 'improvers,' it may be said that the indiscriminate addition of powerful chemical substances, such as hydrofluoric acid, phosphorus pentachlorid, and the oxids and sulphids of phosphorus, to flour is most dangerous."

The author states that the use of cereals other than wheat in the milling of flour is not common in England, though he cites an instance of the addition of maize to flour and to self-raising flour.

"The increasing activity which is now being displayed in the use of different articles as additions to flour must be regarded with considerable apprehension. It does not appear desirable that such an indispensable foodstuff as flour, the purity and wholesomeness of which are of first importance to the community, should be manipulated and treated with foreign substances, the utility of which, from the point of view of the consumer, is more than questionable."

On the presence of calcium sulphate in baking powder and self-raising flour, J. M. HAMILL (*Rpts. Local Govt. Bd.* [*Gt. Brit.*], *Pub. Health and Med. Subjs., n. ser., 1911, No. 46, pp. 16; rev. in Brit. Med. Jour., 1911, No. 2624, pp. 881, 882*).—The data discussed and experiments reported have to do chiefly with the presence of calcium sulphate in baking powders and self-raising flour in Great Britain.

According to the author's conclusions, "acid calcium phosphate of the lowest commercial quality containing large proportions of calcium sulphate as an impurity is used to a considerable extent by makers of self-raising flour, confectioners, wholesale cake makers, etc. Less commonly this low-grade phosphate is an ingredient of baking powders sold as such to the public. Where the maker concerned buys his acid phosphate as such, and selects the lowest grade as the cheapest, he may obtain a slight additional profit from its employment, which, however, may be counterbalanced by the lower efficiency of the article. It does not appear that the consumer derives any benefit; on the contrary, he is liable to be prejudiced by the use of this material. . . .

"If acid phosphates of relatively low commercial quality and purity are used in food preparation, the interests of the majority of the traders concerned, as well as those of the public, would be served by the existence of an understanding as to the degree of impurity which should entail their rejection as food ingredients."

A number of recommendations are made which would lead to improved conditions.

Appended to the paper is a report by C. H. Cribb on the alleged utility of calcium sulphate in "phosphate" baking powders. From a consideration of the data presented the author concludes that "the presence of much calcium sulphate in the residue left by the powder after it has done its work in the loaf seems to be unavoidable. The statement that it is converted into the easily soluble sodium sulphate is not borne out by experiment. A portion of a loaf baked with a powder containing pure acid calcium phosphate, calcium sulphate, and sodium bicarbonate far in excess of the neutralizing power of the phosphate, was dried, very finely powdered, and shaken up with chloroform. A heavy sediment of mineral matter was obtained which contained no calcium carbonate, and in which only ¼ of the total combined sulphuric acid was present as sodium sulphate.

"To whatever extent the formation of sodium sulphate may occur during baking, the ultimate fate of the combined sulphuric acid is to be reconverted once more into calcium sulphate when it reaches the stomach A mixture of tri-calcium phosphate, sodium sulphate and excess of dilute hydrochloric acid of the strength of the gastric juice, after standing for a short time, was found to contain a residue insoluble in strong acid and consisting, as would be expected, entirely of calcium sulphate."

Nutrition investigations on the carbohydrates of lichens, algæ, and related substances, MARY D. SWARTZ (*Trans. Conn. Acad. Arts and Sci., 16 (1911), pp. 247–382*).—The investigations reported have been noted from a summary previously published (E. S. R., 24, p. 367).

Experimental studies of the preservation of horse meat by low temperature and its use as food, A. COSTA and N. MORI (*Clin. Vet.* [*Milan*], *Sez. Prat., 33 (1910), Nos. 50, pp. 793–797; 51, pp. 809–813; 52, pp. 830–832*).—Experimental studies are reported and discussed.

Do Paratyphus-like bacteria occur in meat under normal conditions, and if so, is bacteriological meat inspection necessary? C. BONGARTZ (*Kommen normalerweise im Fleisch unserer Schlachttiere paratyphus-ähnliche Bakterien vor und bedingt der Nachweis derselben die Einführung der bakteriologischen Fleischbeschau? Inaug. Diss., Univ. Bern, 1910, pp. 46*).—Studies were made with samples of meat including that from normal animals, condemned animals, organs, sausage, and other meat products. Micro-organisms were found in a number of the samples, including bacteria of the Paratyphus type. The data are discussed with reference to meat inspection.

In general, the author suggests that an educational campaign is desirable which would point out the necessity for cooking meat and meat products instead of eating them raw or half-cooked.

Fish inspection, P. CANNELLA (*Gior. R. Soc. Naz. Vet., 59 (1910), Nos. 8, pp. 170–172; 9, pp. 199–204; 13, pp. 305–309; 15, pp. 356–362; 17, pp. 403–405; 18, pp. 425–429; 22, pp. 526–529; 23, pp. 561–564; 25, pp. 594–596; 27, pp. 641–644; 28, pp. 671–673; 30, pp. 713–715; 31, pp. 743–747; 33, pp. 788–791; 34, pp. 809–811*).—An extended digest of data regarding fish inspection, particular attention being given to fish inspection in Italy.

Food inspection decisions (*U. S. Dept. Agr., Food Insp. Decisions 134–135, p. 1 each*).—These two decisons have to do, respectively, with the labeling of New Orleans molasses, and saccharin in food.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 806, pp. 6; 807–808, pp. 2 each; 811, pp. 2; 813–814, p. 1 each; 815, pp. 2; 816, pp. 3; 817–819, p. 1 each; 820–821, pp. 2 each; 822, pp. 3; 823, pp. 6; 824, pp. 2; 825, pp. 4; 826–828, p. 2 each; 829, p. 1; 830, pp. 2; 831, p. 1; 832, pp. 3; 833, p. 1; 834, pp. 2; 835, pp. 3; 837, pp 2; 838, p. 1; 839, pp. 3; 840–844, pp. 2 each*).—These notices of judgment have to do with the adulteration of crackers, figs, ice cream cones, olives, tomato catsup, a frozen egg product, tea, prunes, and catsup; the misbranding of flavoring extracts, olive oil, Londonderry lithia water, drug products, sparkling Burgundy and champagne, and mineral water; the adulteration and misbranding of lemon extract, fruit jellies, vinegar, port wine, tomato catsup, alleged temperance drinks, pepper, bitters, coffee, and vanilla extract; and the alleged misbranding of a drug product.

Official inspections (*Maine Sta. Off. Insp. 30, pp. 37–44*).—The results are given of the examination of a large number of samples of oysters, pork sausage, and clams. The question of imitation beer with reference to the Maine Food and Drug Law is also discussed.

[Food inspection], W. D. SAUNDERS (*Dept. Agr. and Immigr. Va., Dairy and Food Div. Bul. 14, pp. 86–117*).—The results are reported of the examination under the state dairy and food commission of a large number of samples of baking powder, beverages, buckwheat flour, condensed milk, and other dairy products, egg substitutes, spices, vinegar, and miscellaneous food materials.

Composition of East Indian food materials, M. GRESHOFF (*Bul. Kolon. Mus. Haarlem, 1910, No. 45, Sup.*).—Continuing earlier work previously noted (E. S. R., 19, p. 163), the author reports analyses of a large number of samples including among others grits, cereal breakfast foods, infant foods, cottonseed meal, cola nut, dried fruits, nuts, Iceland moss, Irish moss, curcuma root stalk, Sicilian manna (*Fraxinus ornus*), milk, and milk products.

[Food of Patagonian natives], C. W. FURLONG (*Harper's Mo. Mag., 122 (1911), No. 732, pp. 813–827, pl. 1, figs. 9, maps 2*).—In an account of the customs and living conditions of the Tehuelches of the Patagonian pampas the author gives some data regarding food conditions. Apparently, these natives live very largely upon the meat of mares and game.

The food of families of Danish laboring men, P. Heiberg and Maria V. Jensen (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 5 (1910), No. 12, pp. 449–461*).—From data recorded in papers left by Schierbeck, and based on the statistical study of laborers' families in Denmark[a] the authors discuss living conditions in the families of Danish laboring men, including the proportionate expenditure of the income for food and other necessaries, and the nutritive value of the diet.

The conclusion is reached that the daily food of the Danish laborer supplies on an average 107 gm. protein, 105 gm. fat, and 493 gm. carbohydrates, the energy value being 3,450 calories.

A suggestion for an emergency ration, C. Ryley (*Jour. Roy. Army Med. Corps, 15 (1910), No. 5, pp. 595, 596*).—The author suggests that cheese, hard biscuit, and a small portion of desiccated soup powder would make a satisfactory emergency ration. The cheese should be in the form of a small block weighing ½ lb., separately molded, and paraffin coated to prevent decomposition in transportation and in tropical climates.

Observations on the minimum amount required for maintenance, A. Loewy and F. Hirschfeld (*Deut. Med. Wchnschr., 36 (1910), No. 39, pp. 1794–1797*).—Though undertaken with special reference to the study of constitutional corpulency, the experimental data are of interest in connection with questions of general nutrition.

The constancy of metabolism for maintenance in healthy man, A. Loewy (*Deut. Med. Wchnschr., 36 (1910), No. 39, pp. 1797, 1798*).—The author summarizes and discusses data which have to do particularly with oxygen consumption.

The work of digestion and Pawlow's investigations, M. Grechen (*Inst. Luxemb., Sect. Sci. Nat.* [*etc.*], *Arch. Trimest., n. ser., 4 (1909), No. 1–2, pp. 116, figs. 19*).—An exhaustive digest of data including a report of the results of experimental studies of digestion by Pawlow's methods.

The digestion of fat in the stomach and small intestine and the influence of lecithin upon it, Usuki (*Arch. Expt. Path. u. Pharmakol., 63 (1910), No. 3–4, pp. 270–293*).—Some of the conclusions from the author's investigations made with a child 9 weeks old follow.

Digestion took place more slowly when milk was fed than was the case with milk with lecithin or with egg yolk, these mixtures leaving the stomach from 1½ to 2 hours sooner. More soaps were found in the intestinal contents on the milk diet than on the milk-lecithin diet, and less than on the egg-yolk-milk diet. Lecithin undergoes cleavage in the stomach more quickly than neutral fats. The presence of lecithin has a favorable action upon the saponification of neutral fats. Although the percentage of lecithin was smaller, yet the digestion of fat on the egg-yolk-milk diet was fully as satisfactory as on the lecithin-milk diet.

No lecithin was found in the intestine. It must therefore have undergone cleavage in the stomach or immediately after entering the intestine.

The rôle of hypophysis in nutrition, F. Duncan (*Presse Méd.* [*Paris*], *1911, No. 31, pp. 312–314*).—Experiments with animals (rabbits) are reported on the effects of hypophysis on nutrition, body temperature, respiration, and other physiological factors. The administration of this material, according to the author, produced, among other effects, rapid loss in weight, increased blood pressure, a lowered elimination of nitrogen, and glycosuria.

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[a] Danmarks Statis. Meddel., 4. ser., 6 (1900), pt. 6, pp. 74; 4. ser., 11 (1901), pt. 2, pp. 101.

[Magnesium and calcium metabolism in] chorea (St. Vitus's dance), J. AULDE (*Reprint from N. Y. Med. Times, 1911, Mar.–Apr., pp. 16*).—This discussion of pathological conditions contains data of interest in connection with the general question of mineral metabolism.

The question of mineral matter in the diet, particularly with reference to the health of children, is taken up, as are other similar topics.

The reactions between chemical compounds and living muscle proteins, V. H. VELEY (*Jour. Chem. Soc. [London], 99 (1911), No. 580, pp. 180–191, dgm. 1*).—When a living muscle is immersed in solutions of certain compounds the author found that "a chemical change takes place between the solute and the muscle proteins or their initial hydrolysis products; its rate can be measured by the heights of response to induction shocks used as an indicating record. . . .

"If the hypothesis be correct that the chemical changes discussed . . . are due to a reaction between the compounds whether acid or base, and the polypeptids, either formed by hydrolysis of the muscle protein or present by virtue of the moribund condition of the muscle, then amino acids in not too highly concentrated solution should produce no effect. Results are given in the case of amino acetic acid in proof of this line of argument."

[Work of the Carnegie nutrition laboratory], F. G. BENEDICT (*Carnegie Inst. Washington Year Book, 9 (1910), pp. 179–194; reprint*).—An account is given of the improvements and changes made in the laboratory equipment, the investigations now in progress are described, and abstracts are presented of papers which have been published during the year.

ANIMAL PRODUCTION.

Feeding stuff inspection (*Maine Sta. Off. Insp. 31, pp. 45–64*).—Analyses are reported of meat scrap, cottonseed meal, linseed-oil meal, gluten feed, distillers' grains, wheat offals, molasses feed, hominy feed, dried-beet pulp, corn meal, and proprietary mixed feeds. A discussion of a recent amendment to the state feeding stuff law and a list of commercial feeds containing whole weed seeds are also given.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 809, 810, pp. 2 each*).—These relate to the misbranding of stock feeds.

[Analyses of] feeding stuffs, J. HENDRICK (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 218–221*).—Analyses are reported of soy beans, linseed cake, rape cake, oatmeal siftings, and a condiment.

Adulteration of linseed cakes and linseed meals in Belgium, L. BUSSARD (*Ann. Falsif., 4 (1911), No. 27, pp. 30, 31; abs. in Analyst, 36 (1911), No. 422, p. 218*).—The principal adulterants of linseed meal in the samples examined were sand and by-products of rice, cottonseed, peanuts, and flaxseed.

The energy of digestion and the specific dynamic effect of feeding stuffs, N. ZUNTZ (*Med. Klinik, 6 (1910), Nos. 8, pp. 309, 310; 9, pp. 351–354; Separate, pp. 14*).—This is a summary of recent investigations on this subject.

The dextrose of the egg and its biological significance, V. DIAMARE (*Rend. Accad. Sci. Fis. e Mat. Napoli, 3. ser., 16 (1910), pp. 242–244; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 580, II, p. 129*).—The eggs of the domestic fowl and of the Grecian tortoise when approaching maturity in the ovary contain dextrose, of which equal amounts were removed by dialysis and hydrolysis, respectively. In the younger eggs the proportion of dialyzable sugar was less and in the very smallest eggs no reducing sugar was present.

On the constitution of the metacarpus in warm and cold blooded horses, J. H. W. T. REIMERS (*Cultura, 22 (1910), No. 268, pp. 599–611, fig. 1*).—This contains data on the length, breadth, and thickness of the walls of the cannon bone in horses. The bones were also examined chemically and microscopically. A bibliography is appended.

The problem of the origin of species and recent theories of heredity, E. Hirs (*Schweiz. Arch. Tierheilk., 53 (1911), Nos. 1, pp. 14–27; 2, pp. 71–85*).—A summary of recent work on heredity and the evolution of species.

The law of the origin of the sex and the means by which the sex of the individual is influenced, I. Sutkowsky (*Berlin. Klinik, 1909, No. 252, pp. 1–47; abs. in Arch. Rassen u. Gesell. Biol., 7 (1910), No. 2, pp. 241, 242*).—Various theories on this subject are reviewed and a new theory proposed, based on the belief that the sex of the embryo is dependent upon the chemical reaction of the medium through which the spermatozoön passes on its way to the egg, as it is very sensitive to change, losing its motility in acids and regaining it in alkalis. It is also claimed that an acid medium causes a production of females and an alkaline medium the production of males.

Kinematography of fertilization and cell division, G. J. Ries (*Arch. Mikros. Anat. u. Entwicklungsgeschichte, 74 (1909), No. 1, pp. 1–31, pls. 2, figs. 12*).—This contains information on the use of the kinematograph, by means of which a continuous picture can be obtained of all stages and changes in the spermatozoa, unfertilized egg, cell division, and the early stages of development of the fertilized eggs.

On the influence of the spermatozoa on the uterus, J. H. F. Kohlbrugge (*Ztschr. Morph. u. Anthropol., 12 (1909), No. 2, pp. 359–368, figs. 2; abs. in Arch. Rassen u. Gesell. Biol., 7 (1910), No. 2, pp. 250, 251*).—The sex organs of 1,300 Javan bats were examined and large numbers of spermatozoa were found in the epithelium of the uterus and in adjoining tissues. The author thinks that the penetration of millions of spermatozoa into the mucosa uteri of great importance, as it may produce an effect similar to that caused by injections of serum, with the possibility that the biochemic changes of the uterine tissues in turn may affect the growing embryo, in which case somatic changes of the embryo would furnish a demonstration of telegony though not necessarily the inheritance of acquired characters.

The influence of the spermatozoa on the blastula, J. H. F. Kohlbrugge (*Arch. Mikros. Anat. u. Entwicklungsgeschichte, 75 (1910), No. 3, pp. 519–521, fig. 1; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 9–10, p. 337*).—Additional experiments on the bat showed that the spermatozoa penetrated the blastula and the embryonic disk after the zona pellucida was ruptured. The author suggests that the sperm entered the developing ova from 8 to 10 days after fertilization, and thus the male may have influenced the embryo apart from amphimixis.

Experimental contributions on abortion and sterility induced by Roentgen rays, F. Trillmich (*Experimenteller Beitrag zur Einleitung des künstlichen Abortus und zur Sterilisation durch Rontgenstrahlen. Inaug. Diss., Univ. Freiburg, 1910, pp. 62; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 6 (1911), No. 8, p. 352*).—Exposure to Roentgen rays caused abortion and sterility in a large percentage of the guinea pigs so treated.

A note on zebra hybrid breeding, E. H. Riley (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 229–232, pls. 3*).—A summary is given of previous attempts by various investigators to obtain zebra hybrids, and a brief report is made of the zebra hybrids which have been obtained at the Bureau experiment station, the data presented being substantially those previously noted from another source (E. S. R., 23, p. 671).

Miscellaneous information concerning the live stock industry, J. Roberts (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 301–342*).—This is the usual annual report, containing information which includes a review of the live stock market in 1909, meat prices at home and abroad, the foreign trade in animals and animal products, federal meat inspection, and data as to the number of live stock registered in the United States, certified pedigree record associations, national and state stock breeders' associations, legal standards for dairy products, contagious diseases of animals in foreign countries, and a list of state live stock sanitary officers.

Information for importers of animals for breeding purposes, G. A. Bell (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 177, pp. 3*).—This contains details of the procedure and requirements under the law and the regulations providing for the importation of animals free of duty for breeding purposes, including the text of that portion of the tariff act of August 5, 1909, relating thereto.

Minutes of evidence taken before the departmental committee on agriculture and live stock, Scotland (*Edinburgh: Govt., 1911, pp. 133*).—This reports the evidence obtained by a committee of inquiry appointed by the secretary of Scotland to inquire and report upon what has been done in the past for the improvement of live stock and agriculture in the congested areas, and to find out what remedies, if any, can be applied to improve the live stock conditions.

British breeds of live stock (*London: Govt., 1910, pp. 137, pls. 45*).—The characteristics of all breeds of live stock, including poultry, common to the British Isles are described. A list of breeding societies, with average prices and places of sale of animals of each breed, is appended.

Cattle raising in Russia, P. A. Pakhomov (*Ezheg. Dept. Zeml. [Russia], 30 (1909), pp. 426–458, pls. 4*).—The present state of cattle raising in Russia is considered from an economic point of view. Measures for improving the stock and methods of feeding and management are discussed.

Feeding experiments with cattle and sheep, 1907–1910, D. A. Gilchrist (*County Northumb., Ed. Com., Bul. 15, pp. 33*).—This is a summary of feeding tests which have been previously noted from various sources.

Improvement of hill pasture as determined by the effect on stock, J. Hendrick (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 190–216*).—This is the third and final report of a series of experiments on improving poor hill pasture by the application of manures and by feeding cake to cattle and sheep, which were begun in 1901 and continued for 10 years. The 4 experiments in the west of Scotland were discontinued at the end of the seventh season. The three localities, Sunderland Hall, Boon, and Naemoor, in the east of Scotland, differed from one another markedly in soil and situation, but gave results which agree in the main points. In certain respects the results were dissimilar to those reported by Somerville (E. S. R., 25, p. 75), but this was to be expected as the soils and conditions are dissimilar.

The main result with these experiments is to support the view that the chemical constituent most needed by such poor pastures is phosphate in a basic form combined with an excess of lime, but the extraordinary results obtained with slag at Cockle Park were not obtained.

"The lime-phosphatic manures—(a) basic slag and (b) superphosphate applied along with lime—have in every case effected a marked and long-continued improvement on the poor pastures to which they were applied. Basic slag applied alone has on the whole given the best return of all the manures. Potash used along with basic slag has not generally paid its way. Even in the case of basic slag, on an average 3 or 4 years elapsed before sufficient result was obtained to pay for the slag. . . . Though a dressing of superphosphate and lime effected a considerable improvement, it did not pay so well as basic slag. The original cost of the dressing was greater, and on the average the return obtained was not greater than that from slag alone. The effect of the dressing was not exhausted in 9 years.

"The feeding of cake gave the worst return of all for the expenditure. In no case did it pay, either in the direct increase made by the sheep or in the improvement effected in the pasture. Generally speaking, very little result is recoverable on these soils from the manure residue of the cake used.

"When the soil is covered with a very thick coarse sod of grass of poor quality, clover plants and the fine grasses have not room to develop, and the effect of the manure is shown only very slowly. On such pasture sheep alone are unable to eat down the grass properly, and better results are obtained when sheep and cattle are grazed on the same land. On such land cattle make far greater live weight increase per acre than sheep."

[Experiments with sheep], T. R. ARKELL (*New Hampshire Sta. Bul. 151, pp. 32–38*).—A report of progress of work in sheep breeding and feeding begun in 1908. The breeds used were Dorset, Hampshire, Shropshire, Southdown, Merino, Leicester, and Rambouillet. Records are kept of 26 characteristics for each sheep. The present report treats of the results obtained with the F_1 generation only. "The F_1 heterozygotes produced from a cross between sheep possessing respectively very dark and pure white hair color usually present a mosaic appearance. However, in every instance there is a clear preponderance of the black color. It also appears from experimental evidence we have on hand that skin pigmentation in sheep is inherited in a similar fashion."

The inheritance of horns agrees with the results obtained by Wood (E. S. R. 22, p. 378). An extended distribution of wool about the face, ears, and legs appears to dominate over the less extended or sparser covering. Skin folding appears to be dominant over the smooth skin, and white wool dominant over black. The best results obtained in raising early lambs were the crosses of the Hampshire or Shropshire ram on Merino, Merino grade, or Desert Horn ewe The early lambs shrank in dressing from 50 to 55 per cent.

A brief report is made of a feeding test, details of which will be given in a forthcoming bulletin.

The development of the skeleton of sheep under normal conditions, with insufficient feed, and after castration at an early age, N. TSCHIRWINSKY (*Arch. Mikros. Anat. u. Entwicklungsgeschichte, 75 (1910), No. 3, pp. 522–561; abs. in Zentbl. Allg. u. Expt. Biol., 1 (1910), No. 9–10, p. 342; Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 6 (1911), No. 5, pp. 223, 224*).—A short résumé of a more extensive work in Russian, which contains a large amount of data on the form, size, and differences in weight of sheep.

The differences between the skeleton in normal and abnormal animals are pointed out. Castration of lambs at 1 month of age lengthens the neck and the long bones, shortens and broadens the os innominatum, inhibits the growth of horns, changes the skull in many ways, and affects the weight and height of the different parts of the body disproportionately.

Periodic migration in Spain, A. FRIBOURG (*Ann. Géogr., 19 (1910), No. 105, pp. 231–244, pls. 2, figs. 3*).—This discusses the climatic and economic conditions which have affected the periodic migrations of flocks of sheep between winter and summer pastures. The distribution of sheep and the routes of migrating flocks are illustrated by maps.

Sheep raising in Russia, R. R. PRAVOKHENSKI (*Ezheg. Dept. Zeml. [Russia], 30 (1909), pp. 459–484, charts 5*).—A historical survey of the development of sheep raising in Russia, and a description of the present condition of this industry. According to the best available statistics in 1909 European Russia contained 85,000,000 sheep, or 34 sheep to every 100 persons.

[Lamb shearing experiments in New Zealand] (*Jour. New Zeal. Dept. Agr., 1 (1910), No. 3, pp. 217; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 123*).—Twenty lambs were divided into 2 lots, one lot of which was shorn. At the end of 6 months the unshorn lot had gained in weight 35 lbs. more than the other, and at the end of 9 months 75 lbs. Later, when the 2 lots were shorn, the unshorn lot gave an average of 2.1 lbs. more wool than the other.

Corn, soy-bean pastures, tankage and cotton-seed meal for fattening hogs, D. T. GRAY, J. W. RIDGWAY, and E. R. EUDALY (*Alabama Col. Sta. Bul. 154, pp. 45–87, figs. 14*).—A report of 3 years' work in feeding 105 hogs in order to determine (1) the value of soy-bean pasture as compared with other feeds, (2) the most profitable amount of corn to be fed as a supplement, and (3) the effect of soy-bean forage on the quality of the pork.

When corn was used alone the average daily gain for each hog was 0.375 lb. at a cost of 7.61 cts. When a soy-bean pasture was grazed with a one-fourth, one-half, and three-fourths ration of corn the average daily gains were raised to 1.102, 1.006, and 1.329 lbs., respectively, and the cost of the pork reduced to 2.59, 3.36, and 3.17 cts. per pound, respectively. One acre of soy-bean pasture afforded grazing for 10 hogs for 43 days when a one-fourth ration of corn was fed, 48 days on a one-half-ration of corn, and 62 days on a three-fourths ration of corn. The total value of pork made on each acre of soy-bean pasture varied from $25.84 to $39.13.

Tankage and cotton-seed meal proved to have about equal feeding value, as supplements to corn in the dry lot. It proved profitable to enclose the hogs in a dry lot after the pasture crops were exhausted and to feed for a short time on grain.

A summary of Bulletin 143, previously noted (E. S. R., 20, p. 569), is included.

Origin of the Clydesdale and other heavy breeds of horses, J. C. EWART (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 151–169, figs. 16*).—From studies of the skulls, teeth, limbs, etc., of fossil and living horses, the author concludes that the modern heavy English breeds have been the result of a blend, in most cases of 3 distinct wild races, namely (1) a large, robust, broad-browed race, with a straight or dished face, and with stout limbs adapted for a forest life; (2) a race in build not unlike certain modern thoroughbreds, characterized by a face bent downward on the cranium, a prominence between the eyes, long limbs, well-laid shoulders, high withers, and a high set-on tail; and (3) a race highly specialized for a steppe life, characterized by a long, narrow face, and, as in many steppe forms, by large nasal chambers (which imply a "Roman nose"), by clean limbs, close hocks, and a wonderful power of clearing obstacles.

Breeding horses for the United States Army (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 178, pp. 13*).—The information contained in this circular is taken from the report of the chief of the Bureau of Animal Industry for 1910, previously noted (E. S. R., 25, p. 95). It is claimed that the supply of horses fit for army remounts has become so limited as to make it necessary for the Government to encourage the breeding of army horses. A brief outline is given of the plan proposed for the purchasing of stallions and the proposed method of breeding.

The Braekel hen, L. VANDER SNICKT (*Chasse et Pêche, 29 (1910), No. 5, p. 98; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, Nov., p. 133*).—An account of a breed of fowls known in France as the Braekel and in England as the Campine.

Capons and caponizing, R. R. SLOCUM (*U. S. Dept. Agr., Farmers' Bul. 452, pp. 16, figs. 7*).—A revision of an article previously noted (E. S. R., 18, p. 1158).

The ostrich industry in the United States, A. R. LEE (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 233–238, pls. 3; Circ. 172, pp. 233–238, pls. 3*).—The following topics relating to ostrich farming are discussed: Breeds and management, incubation, brooding, parasites and diseases, plucking, adaptability of different sections of the United States for ostrich raising, and the probable future of the industry.

Water glass a preservative for eggs, G. H. LAMSON (*Connecticut Storrs Sta. Bul. 67, pp. 267–274, fig. 1*).—A revision of a portion of a bulletin previously noted (E. S. R., 20, p. 1070).

A system of poultry accounting, R. R. SLOCUM (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 176, pp. 6*).—This circular explains a system of keeping an account of the poultry flock which will enable the owner to determine its status at the end of each year. Specimen pages are given for an inventory sheet, monthly summary sheet, yearly summary sheet, balance sheet, and yearly egg record.

Marketing eggs through the creamery, R. R. SLOCUM (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 239–246; Farmers' Bul. 445, pp. 12*).—This contains information on methods of marketing eggs, including an account of the system followed by a creamery in northern Minnesota in handling them. Among the advantages found have been an increased price for the eggs and a decided improvement in their quality.

The sanitary construction and equipment of abattoirs and packing houses, G. H. PARKS (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 247–263, pl. 1, fig. 1; Circ. 173, pp. 247–263, pl. 1, fig. 1*).—In this paper the author deals with the principles and sanitary features of abattoir construction.

"All buildings that are to be used for the purpose of slaughtering animals for the preparation of meat or meat food products should meet the following requirements: (1) A location on a site that is dry and with an aspect which gives an abundance of sunlight; (2) an abundant supply of pure water, by means of which perfect cleanliness of all parts of the building can be secured, and proper means for the removal of waste water; (3) a system of immediate and perfect sewage removal which renders it impossible that the air or water shall be contaminated; (4) a system of ventilation which carries off all impurities from the air of the rooms and supplies clean, pure air as required; (5) a condition of building construction which admits of perfect cleanliness of the ceilings, columns, walls, and floors; and (6) proper equipment."

DAIRY FARMING—DAIRYING.

Report of the activities of the dairy institute at Hameln, 1910, P. VIETH (*Ber. Milchw. Inst. Hameln, 1910, pp. 25*).—This contains brief reports on trials of separators and other dairy apparatus, and analysis of milk, butter, and cheese.

Cow-testing associations, H. RABILD (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 99–118; Circ. 179, pp. 24*).—This gives an account of the origin of the cow-testing associations in Denmark in 1892 and the growth of the movement in other countries. Their value to the dairy industry, as shown by the records of the associations, is pointed out, and methods of organizing the farmers and testing the herds are discussed. Special attention is given to the work of the associations in the United States, which has been encouraged by this Department. Forms for a constitution and by-laws of the association and the contract used in organizing it are given.

The influence of food on the composition of milk, A. CICCARELLI (*Gior. R. Soc. Ital. Ig., 31 (1909), No. 7, pp. 308–319; abs. in Milchw. Zentbl., 6 (1910), No. 9, p. 428*).—The addition of beet chips to a normal ration did not appear to affect the composition of the milk, but an exclusive beet chip diet caused the milk to be poor in protein and fat. Such milk is not recommended for feeding infants.

On factors influencing the functional activity of the mammary gland, G. D'ERRICO (*Pediatria [Naples], 18 (1910), No. 4, pp. 253–266; abs. in Rev. Hyg. et Méd. Infant., 9 (1910), No. 5–6, pp. 541, 542*).—The author's experiments with dogs indicate that a ferment is produced in the fetal membrane which causes hypertrophy of the mammary gland. An intravenous injection of defibrinated blood obtained from a pregnant dog inhibited milk secretion of a lactating female dog, but the blood of a normal animal did not have this effect.

Fermented milks, L. A. ROGERS (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 133–161, fig. 1; Circ. 171, pp. 133–161, fig. 1*).—This contains a summary of investigations on the biology and therapeutic value of fermented milk preparations sold under various trade names, as zoulak, vitallac, yoghourt, matzoon, bacillac, kefir, koumiss, and lactobacillin. The methods of preparation are discussed, and a bibliography of 76 titles is appended.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 812, pp. 2; 836, p. 1; 845, pp. 2*).—These relate to the adulteration of butter and condensed milk.

The extra cost of producing clean milk, G. M. WHITAKER (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 119–131, pls. 4, fig. 1; Circ. 170, pp. 119–131, pls. 4, fig. 1*).—The aim of this article was to furnish accurate statements as to what modern sanitary milk means and the extra cost to the dairyman. Some of the conclusions are as follows:

"To increase the score of a dairy from 42 to approximately 70 points, there may be in 15-cow dairies an added expense of 5 cts. per cow per day for labor, plus, in extreme cases, 5½ cts. for new or additional equipment; and if we add 5 cts. more to remunerate the proprietor for his extra care and vigilance, there will be an extreme increase of 15½ cts. per cow per day. The product of a cow ranges from 4,000 to 10,000 lbs. of milk a year, or from 5 to 12 qts. a day. The added expense for labor would, therefore, amount to about half a cent to 1 ct. a quart, and in the rare instances where great additional expense is required for repairs, new construction, and new equipment this might raise the increase 1 to 2 cts. a quart more. . . . This added expense of improved methods and equipment, however, would no doubt be partly offset by increased production and increased economy of feed, so that the net extra expense of producing clean milk would probably be somewhat less than the figures given. . . . A reasonably clean milk is worth 2 cts. more than common slovenly milk. The former is safer, and therefore cheaper, at the increased price." "Dirty milk ought not to be considered a merchantable article at any price, no matter how low."

Medical milk commissions and bovine tuberculosis, E. C. SCHROEDER (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 193–200*).—This is a paper presented before the American Association of Medical Milk Commissions at St. Louis, Mo., June, 1910, and is a consideration of the susceptibility of persons to bovine types of tubercle bacilli and of the occurrence of tubercle bacilli in milk.

Some of the conclusions drawn are the following: "The evidence we have to prove that tubercle bacilli derived from cattle cause tuberculosis—and fatal tuberculosis—among human beings is direct and irrefutable. The evidence we have to prove that the milk from tuberculous dairy herds frequently contains living virulent tubercle bacilli is equally direct and irrefutable. Hence no medical milk commission should consent to the certification of milk unless it is obtained from cows that are free from tuberculosis and that are kept in an environment free from tuberculosis infection. . . . Pasteurization should be recommended for all milk that is not certainly free from the germs of tuberculosis or those of other diseases . . . . Until commercial pasteurization has been placed under official supervision, home pasteurization seems to be the best solution."

Tubercle bacilli in market milk in Philadelphia, H. C. CAMPBELL (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 163–177*).—Data on the percentage of fat, total solids, specific gravity of milk, and the number of leucocytes and bacteria in the market milk of Philadelphia are presented in tabular form.

In a study of the presence of streptococci and tubercle bacilli, subcutaneous inoculations were made on guinea pigs. In the ordinary market milk, many cases where the pigs died of septic peritonitis a microscopic examination revealed the presence of streptococci. Of 123 samples of market milk with which inoculations were completed, 18 were found to contain tubercle bacilli, or 14.6 per cent. It is stated that if all the experimental animals had lived sufficiently long for the lesions to develop the percentage found would probably have been even higher.

In "pasteurized" milk obtained from dealers known to have pasteurizing machines the number of bacteria present in most of the samples indicated that either the milk was not properly pasteurized or that it was placed under bad conditions after the process was completed. Inoculations showed that 1 sample out of 12 contained virulent tubercle bacilli. In other market milks claimed to be pasteurized a large number of bacteria were found, and the great increase in the count of leucocytes after heating to 60° C. suggested that pasteurization had not been practiced in the majority of the samples. Inoculations of these milks likewise showed that 1 sample out of 12 contained virulent tubercle bacilli.

"The method of commercial pasteurization used in the trade can not be relied upon as a means of destroying disease-producing bacteria. If pasteurization is to be used as a means of purifying milk, it should be done under legal regulation and official supervision. A microscopic examination for determining the presence of tubercle bacilli in milk is of little value."

The viability of tubercle bacilli in butter, J. R. MOHLER, H. J. WASHBURN, and L. A. ROGERS (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 179–185, fig. 1*).—Butter was made from milk inoculated with tubercle bacilli, packed in glass jars, and sent by express to Chicago. After remaining in storage for periods varying from 10 days to 6 months, guinea pigs were fed the butter and others were inoculated with it.

It was found that the storage of butter at ordinary temperatures during a period approximating the length of time that market butter is usually held will not destroy the vitality of tubercle bacilli within the product. The experiments also indicated that the organisms were not distributed uniformly throughout the product, and it is stated that the test should cover a considerable length of time, since negative results may lead to erroneous conclusions if not properly controlled by subsequent experiments. For example, certain samples failed to cause tuberculosis in the experimental animals when the butter was

10 days old, while other samples from the same lot but 90 days old produced tuberculosis. The most highly infectious lot was butter made from milk secreted by a tuberculous udder. The inoculation of guinea pigs with products suspected of being tuberculous was found to be a more delicate test than the feeding experiments.

The inference drawn from this work is that the most satisfactory way of producing sanitary or certified milk would be to manufacture butter only from cream that is free from tubercle bacilli. Though the application of the tuberculin test is desirable, pasteurization should be resorted to where it is not practicable. No dependence can be placed on the germicidal action of salt.

The viability of tubercle bacilli in cheese, J. R. MOHLER, H. J. WASHBURN, and C. F. DOANE (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 187–191*).—Cheese made from milk which had been inoculated with tubercle bacilli was ripened at a temperature of about 65° F. for 7 days, then put into tin cans and placed in cold storage at about 33° F. At periods ranging from 23 to 383 days from the day the cheese was made it was used for feeding and for inoculating guinea pigs.

None of the animals used in testing the cheese when it was 23 days old developed tuberculosis, either in those inoculated or in those fed, but generalized tuberculosis was more or less prevalent in the lots fed or inoculated when the cheese was from 33 to 261 days old. The results were again negative in all cases after the cheese was 297 days old. As in the case of the investigations in butter (noted above), the bacilli were found to be irregularly distributed.

As a result of these experiments it is evident that tubercle bacilli remain virulent in cheese for a considerable period of time, and that cheese made from raw unpasteurized milk should be considered a possible carrier of tubercle bacilli. It is recommended that some steps be taken to prevent the introduction of living virulent tubercle bacilli into this important food, either by subjecting all cows to the tuberculin test or by pasteurizing the milk.

VETERINARY MEDICINE.

Results of investigations in the field of general pathology and pathological anatomy of man and animals, edited by O. LUBARSCH and R. OSTERTAG (*Ergeb. Allg. Path. Mensch. u. Tiere, 12 (1908), pp. X+801; 13 (1909), pts. 1, pp. IX+629; 2, pp. VIII+694; 14 (1910), pts. 1, pp. X+771; 2, pp. IX+932*).—These are annual reviews of the literature on pathology in continuation of the series previously noted (E. S. R., 19, p. 1180). As in previous issues, extensive classified bibliographies and author and subject indexes are included.

Results of investigations in the field of general pathology and pathological anatomy of man and animals, edited by O. LUBARSCH and R. OSTERTAG (*Ergeb. Allg. Path. Mensch. u. Tiere, 12 (1908), pp. X+801; 13 (1909), 819*).—In this supplemental volume a comprehensive review is given of literature published during the years 1906 to 1909 on the general pathology and pathological anatomy of the eye.

Extensive classified bibliographies are included.

Research work.—Diseases of animals, F. TIDSWELL (*Rpt. Govt. Bur. Microbiol. N. S. Wales, 1909, pp. 11–53, dgms. 2*).—A discussion of the principles involved in the investigation of infectious diseases is first entered into. Bacterial infections are then taken up and information presented upon tuberculosis, plague, including a tabular report on ecto-parasites collected from rodents in 1909, pseudo-tuberculosis (lymphadenitis) in sheep, bovine mammitis, etc. The protozoan diseases considered include endemic hematuria in cattle, jaundice in lambs, balanitis in sheep, etc. A list is also given of the insects, ticks, etc., known to transmit or suspected of transmitting the parasites of various diseases of man and animals.

The sources and modes of infection, C. V. Chapin (*New York and London, 1910, pp. IX+399*).—According to the author, this work is intended to indicate the principles which should guide sanitary practice, and to point out how laboratory work and epidemiological studies in recent years have modified certain of these principles. Its chapters take up the life of disease germs outside of the body, carriers, and missed cases, limitations to the value of isolation, and infection by contact, fomites, air, food and drink, and insects.

Handbook of physiological methods, R. Tigerstedt (*Hanb. Physiol. Methodik, 2 (1911), 4. Abt., pp. 378, figs. 117*).—This is the fourth part of the second volume of this work, and contains a description of the technique and apparatus utilized in hemodynamics. The main chapters are on hemodynamical measuring and registering instruments (36 figures) and special hemodynamic methods and hemodynamic operations (81 figures).

This work will be of value to those interested in studying the physiology and pathology of the blood and blood stream.

The behavior of the fatty substances in the kidney of the dog, A. Wisskirchen (*Über das Verhalten der fettigen Substanzen in der Hundeniere. Inaug. Diss., Univ. Bern, 1909, pp. 19, pl. 1, figs. 2*).—The principal object of this work was to determine whether physiological fat was present in the kidneys of normal dogs. Kidneys were examined from 22 normal healthy dogs of various ages, from 21 starving and undernourished dogs, from 3 overnourished and obese dogs, from 22 nephritic (catarrhal distemper) dogs, and from 42 dogs treated with various poisons (phosphorus, phloridzin, strychnin, potassium bichromate, etc.), and from 3 dogs in which the pancreas had been extirpated.

The results of the work show that the kidneys of all normal dogs contain fat in the cells of the medullary rays (newborn or young animals have the fat of the kidneys lodged in the basal portion of the cells of the ductus papillares). In the dogs which had starved for a long period or where little fat was given in the food, the fat in the medullary rays diminished partly or completely. On the other hand, the kidneys of the overnourished and obese animals showed fatty infiltration in the loops of Henle and the contorted tubules. In the poisoned dogs the lesions were either diffuse or focal, but in all instances the initial degenerative process began in the medullary rays and in the contorted tubules.

A suggestion for a simple expression of the value of a specific serum, Lentz (*Ztschr. Imunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 7, p. 797*).—The author suggests expressing the results of a serological test in the form of a fraction. When determining the agglutination of a certain bacterial strain with a definite amount of serum, the numerator represents the value found, and the denominator the titer of the serum.

In regard to the existence of a diastatic leucocyte ferment, L. Haberlandt (*Pflüger's Arch. Physiol., 132 (1910), No. 1-4, pp. 175-204, pl. 1*).—The results point to the view that the diastatic ferment which exists in blood serum is partly of leucocytic origin.

In regard to the splitting off of the bacteriolytic immune body, W. Spät (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 7 (1910), No. 6, pp. 712-720*).—The immune body bound to the cholera vibrio can be split off and can be conveyed to other fluids. These fluids then give the same reactions which were previously possessed by the original serum, even after heating. The activity of the extract is greatest when the sensitization of the bacteria is made with an inactive serum.

Secondary and tertiary cholera substances are capable of binding immune substances; cholera-precipitates, on the other hand, do not possess any binding capacity for normal serum.

The cause of natural immunity in pneumonia, E. UNGERMANN (*Arb. K. Gsndhtsamt., 36 (1911), No. 3, pp. 341–357*).—It is concluded that normal resistance against pneumonia is due to the phagocytic power of the fresh normal serum.

Studies in regard to the complement binding phenomena in hemorrhagic septicema, T. MATSUDA (*Ztschr. Hyg. u. Infektionskrank., 66 (1910), No. 3, pp. 383–392*).—This is in part a verification of the work of Wassermann, Citron, and Pütz.[a]

From the results it is noted that after a single infection the blood serum is so changed that in conjunction with the antigen it inhibits hemolysis. Furthermore, it is seen that it is possible with the method to differentiate the individual members of the septicemia group.

Treatment of Purpura hemorrhagica with streptolytic serum, J. J. JOY (*Amer. Vet. Rev., 38 (1911), No. 4, pp. 539, 540*).—The author with 30 cases of this condition and serum had quicker and cleaner recoveries than with the old line treatment. The histories of 3 cases are appended.

Differentiation of the meningoococcus from similar organisms by the peritoneal test, C. DOPTER (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 38, pp. 600–602*).—The test is based on the reaction of Pfeiffer, and was made with the true meningococcus, the pseudomeningococcus, and the gonococcus.

The action of spermotoxins upon the female organism and the egg, M. P. TUSHNOV (*Uchen. Zap. Kazan, Vet. Inst., 27 (1910), No. 1, pp. 29–31; abs. in Ztschr. Immunitatsf. u. Expt. Ther., II, Ref., 3 (1910), No. 7, p. 820*).—The author reports the fact that he was able to immunize actively rabbits with sperma-spermotoxin, and thus produce sterility.

Report of the Bombay bacteriological laboratory, W. B. BANNERMAN (*Rpt. Bombay Bact. Lab. 1909, pp. 19*).—A report of the activities of the laboratory for the year 1909. It has particular reference to the control of plague and gives statistics in regard to vaccination against this malady.

Clinical results with bacterial vaccine, F. E. BARNES (*Amer. Vet. Rev., 38 (1910), No. 3, pp. 392, 393*).—A report of 10 cases, among which were poll evil, quittor, and fistula, and which were successfully treated with antisuppuration bacterial vaccine.

The action of Bacillus coli on the animal organism, J. STUDZINSKI (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 7, pp. 225–227*).—In this preliminary note the author states that after giving *B. coli* subcutaneously, intravenously, intraperitoneally, and per buccal cavity, lesions could be noted in the liver and kidneys. The gross and microscopic characteristics are stated in detail.

Investigations in regard to the serum of sheep infected with the Preisz-Nocard bacillus and that of cachetic horses, G. FINZI (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 25, pp. 64–66; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 3, p. 599*).—The antitryptic property in the serum of a sheep infected with the Preisz-Nocard bacillus is almost always uniformly diminished, and where caseous suppuration exists the antitryptic index is always lower. No benefit therefore can be expected by noting the variations in the hemolytic capacity of the serum for detecting tuberculosis, caseous suppuration, or scours, because the variations are not characteristic of any disease.

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[a] Deut. Med. Wchnschr., 31 (1905), No. 28, p. 1101; Ztschr. Hyg. u. Infektionskrank, 52 (1906), No. 2, p. 238; 56 (1907) No. 1, p. 145; Centbl. Bakt. [etc.], 1. Abt., Orig., 40 (1905), No. 1, p. 153.

Anthrax, with special reference to its suppression, H. J. Washburn (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 217–228, pls. 3; Farmers' Bul. 439, pp. 16*).—This paper discusses the nature and history of the disease, the forms of anthrax, the anthrax bacillus, methods of combating infectious diseases, vaccination as a preventive, and other preventive measures.

The vaccination of bovines against symptomatic anthrax in Switzerland and other countries, R. Balavoine (*Schweiz. Arch. Tierheilk., 51 (1909), No. 3, pp. 137–185, figs. 7; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 52, p. 1053*).—After describing the various vaccinating methods and substances, the author discusses the results obtained up to date in the Cantons of Bern, Waadt, Freiburg, Glarus, and Graubünden in Switzerland, and, further, in Baden and Bavaria in Germany, and in the United States.

From the results obtained the author concludes that much danger is connected with the vaccination against symptomatic anthrax, and recommends that when vaccination is done it should always be accompanied with an insurance against the loss of the animal. Such is the case in the Canton of Bern.

A report on the outbreaks of aphthous fever in Pennsylvania in 1908–9, L. Pearson (*Ann. Rpt. Penn. Dept. Agr., 15 (1909), pp. 181–247, pls. 14, map 1*).—This is a detailed account of the work conducted by the State of Pennsylvania during the outbreak of foot-and-mouth disease in 1908–9, a report of which by the Bureau of Animal Industry of this Department has been previously noted (E. S. R., 21, p. 383).

Parturient palsy, A. E. Robertson (*Amer. Vet. Rev., 38 (1910), No. 3, pp. 390, 391*).—A description of 2 cases of this disease with unusual symptoms.

The nature, cause, and prevalence of rabies, J. R. Mohler (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 201–216*).—In this paper the author deals with the nature and characteristics of the disease, its etiology, its transmission by milk and meat, its differential diagnosis, its distribution and prevalence, and its prevention and eradicaton.

Rabies or hydrophobia, J. R. Mohler (*U. S. Dept. Agr., Farmers' Bul. 449, pp. 23*).—This paper is based upon the article above noted.

The complement binding reaction for diagnosing rabies, W. Nedrigailoff and W. Sawtschenko (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 8 (1910), No. 3, pp. 353–357*).—A specific rabicidal serum yields a complement binding reaction, (1) with the brain substance from rabid and normal animals, and (2) with the salivary glands from man and dog dying as a result of rabies.

No reaction could be obtained with the extracts of the internal organs and muscles from man, dogs, guinea pigs, rabbits, and sheep dying from rabies.

The treatment of rabies in animals, P. Remlinger (*Rev. Gén. Méd. Vét., 16 (1910), No. 189, pp. 489–507*).—The author, after considering the various methods in use for treating rabies in animals, such as the dog, rabbit, sheep, bovine, and horse, and in man, details some of his results obtained by the simultaneous serum-virus method for animals.

The results show that an excess of virus in the mixture is better than an excess of serum for vaccination.

A study of surra found in an importation of cattle, followed by prompt eradication, J. R. Mohler and W. Thompson (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 81–98, pls. 3, figs. 2; Circ. 169, pp. 18–97, pls. 3, figs. 2*).—Of 46 bulls, 2 cows, 1 heifer, and 2 calves of 7 different breeds of the so-called Brahman cattle that were introduced into this country from India in June, 1906, 3 were found by injecting the blood into rabbits on July 5 and 6 to be infected with *Trypanosoma evansi*, the causative agent of surra. The 3 infected animals were destroyed July 20 and the remaining cattle protected from blood-sucking flies and mosquitoes which swarmed around the corral in countless numbers. "On completion of the screening of the south and east sides of the corral an abundant supply of sticky and poisonous fly paper was spread about within the inclosure, and very shortly all the *Tabanus atratus* were caught or destroyed, along with large numbers of the other Tabanidæ and *Stomoxys calcitrans*, one of the Muscidæ. However, a considerable number of the latter species and a few *T. lincola* and *T. costalis* still remained, and it seemed impossible to eliminate them by this temporary screening."

In a second series of inoculations made July 31, 7 animals were found infected and were destroyed. A specially constructed fly-proof stable containing individual fly-proof box stalls was then erected for the purpose of eliminating all kinds of flies, and especially the stable fly, *S. calcitrans*, considered by some authorities as being capable of transmitting trypanosomal infections. "After this second test it seemed plausible to consider that only the Tabanidæ—and probably only the *Tabanus atratus*—were responsible for the spread of the infection, and that the disease would be eradicated with the elimination of those animals which had been infected by these flies previous to July 27, when this Tabanus was effectually excluded as a factor in the conveyance of the infection."

Four additional animals were found infected on August 6 and 4 on August 11 and were destroyed, making a total of 18. Further injections of blood resulted negatively and the remaining animals, 33 in number, were released from quarantine on November 4, 1906.

The investigations led the authors to conclude that there were only 3 infected zebus at the time of arrival of the cattle in quarantine and that the others became subsequently infected by means of the plague of flies present in the vicinity of the quarantine station.

The authors discuss the history of the importation of Indian cattle into America, the characteristics of Indian cattle, the nature of the causative agent of surra and the disease which it produces, rabbit experiments with infected blood, and the rôle of the Tabanidæ in the transmission of surra.

"It has been definitely shown that in surra as well as in other trypanosomal infections microscopical examination of either stained or unstained blood films will not suffice in making a diagnosis, and that the only satisfactory results are obtained by animal, particularly rabbit, inoculations.

"Relative to further importations into the United States of any class of susceptible animals from surra-infected countries for agricultural purposes or for menageries or zoological gardens, the experience gained in this outbreak indicates that it would be imprudent to import such possibly infected animals without testing each individual, either before or after arrival, by blood inoculations of susceptible small animals, preferably rabbits."

The susceptibility of the dog to African horse-sickness, A. Theiler (*Jour. Compar. Path. and Ther., 23 (1910), No. 4, pp. 315–325*).—This reply to the account previously noted (E. S. R., 23, p. 391) includes a report of further experiments.

"Of 2 dogs injected subcutaneously with 5 cc. of a filtrate mixture obtained by diluting 1 cc. of virus with 4 cc. water and passing the mixture through a Berkefeld filter both contracted typical horse-sickness reactions, and one died with all the lesions of horse-sickness on post-mortem examination. The blood of the dog which died, tapped during the reaction and 2 cc. injected subcutaneously into a mule, communicated typical horse-sickness of an acute type, from which the mule died. . . . Of 7 susceptible dogs injected with blood of a dog suffering from horse-sickness, all contracted typical horse-sickness reactions. The dog injected with one-thousandth part of a cubic centimeter recovered from the disease, but the injection of 2 cc. of its blood proved virulent for a horse which died of horse-sickness on the eleventh day."

Note regarding the preceding article, J. McFadyean (*Jour. Compar. Path. and Ther., 23 (1910), No. 4, pp. 325–328*).—A further discussion of the subject.

Contribution to the biology of the tubercle bacillus and some acid-fast saprophytes, H. Windisch (*Beitrag zur Biologie des Tuberkelbazillus und einiger Säurefester Saprophyten. Inaug. Diss., Univ. Bern, 1908, pp. 90*).—In this work the author found that the human type of tubercle bacillus when grown in acid bouillon changes its characteristics in so far that it at times reduces the acidity and at other times increases it, but that in most instances the reaction never reaches the neutral point. This manifestation, however, is inconstant, as there are strains which make bouillon alkaline and then go over to acid formation. In a bouillon of the same composition, the human type of bacilli, which were rendered avirulent by passing them through cold-blooded animals, usually made the media alkaline. Bovine tubercle bacilli and the bacilli from cold-blooded animals render the substrat alkaline, and it remains so. Avian tubercle bacilli likewise produce basic substances which render the media less acid; but alkalinity only sets in with these bacteria when a superficial growth is present. The various acid-fast saprophytes examined by the author when grown in an acid medium in most instances produced a strong alkalinity.

The author, on the basis of the above tests, does not believe that the various types of tubercle bacilli can be differentiated from one another by the production of acid or alkali.

Human tuberculosis as a symbiotic double infection, Sophie Fuchs (*Ztschr. Tuberkulose, 16 (1910), No. 4, pp. 351–364, figs. 5*).—The author, on the basis of C. Spengler's theories (E. S. R., 24, p. 483) in regard to *Bacillus humano-longus*, shows that tuberculosis in man rests upon a symbiotic double infection which can be proved by the double precipitin reaction, and furthermore by the general behavior of the precipitins in the blood.

The diagnostic and prognostic value of Ehrlich's diazo reaction in pulmonary tuberculosis and its behavior during specific treatment, J. von Szabóky (*Ztschr. Tuberkulose, 17 (1911), No. 2, pp. 105–119*).—The author investigated 422 urines, 372 of which came from tuberculous subjects (man), 12 from suspected cases, and 38 from nontuberculous cases. From this work he concludes that the diazo reaction has no value as a diagnostic reagent, but that where it is constantly present in tuberculous subjects it points to a bad prognosis.

A contribution to the ophthalmo-reaction obtained with Bovo-tuberculol D, Abel (*Berlin. Tierärztl. Wchnschr, 27 (1911), No. 14, pp. 236, 237*).—Comparative tests between Bovo-tuberculol D (Merck) per conjunctival sac and Koch's tuberculin injected subcutaneously led the author to conclude that the former does present some advantages over the latter.

The precipitin reaction for the diagnosis of tuberculosis, H. Vallée and G. Finzi (*Rec. Méd. Vét., 87 (1910), No. 18, pp. 408–413; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 9, p. 905*).—According to the author, the precipitin reaction under certain conditions can be a valuable diagnostic agent for tuberculosis.

Experimental studies in tuberculosis, A. Marxer (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 7, pp. 115–117*).—From these experiments, which deal with the bactericidal properties of sodium oleate for the tubercle bacillus, the author concludes that this substance is capable of fully destroying the viability of the tubercle bacillus, and that bacteria so killed are very efficient for immunizing purposes.

Report of the International Commission on the Control of Bovine Tuberculosis (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 175, pp. 27*).—This is a detailed report of the various committees of this commission, who conducted investigations in regard to (1) education and legislation, (2) location of tuberculosis in cattle, (3) dissemination of bovine tuberculosis, and (4) disposition of tuberculous animals, together with 15 resolutions adopted by the commission as a whole.

Report of the International Commission on the Control of Bovine Tuberculosis (*Ottawa: Govt., 1910, pp. 41; reprint from Proc. Amer. Vet. Med. Assoc., 47 (1910), pp. 31; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1911), No. 4, pp. 213–215*).—Noted above.

The occurrence of actinomycosis in cows' udders, J. H. Patterson (*Vet. Jour., 67 (1911), No. 431, pp. 269–271*).—In investigations of about 50 specimens of udders (examined within a period of 2 years) suspected of tuberculous lesions, the author found the lesions in 5 of the cases, or an average of 10 per cent. to be due to actinomyces.

Contagious granular vaginitis in cattle, and its relation to sterility and abortion, A. Wilson (*Vet. Jour., 66 (1910) No. 422, pp. 460–482*).—This paper discusses the etiology, symptoms and course, differential diagnosis, therapeutics, sequelæ, etc., and reports cases of this disease.

Of 1,800 head of cattle examined by the author within the year, 60 per cent of the females were affected with chronic vaginitis follicularis in varying degree; most of the animals were bred in Essex, while others were brought from different counties to be tested. It is stated that not a single case of the acute disease, as described by European writers, has presented itself.

"Contagious granular vaginitis is to be handled as an infectious disease on the usual lines, disinfection and isolation being essential for its control and eradication. The earlier stages of the malady call for curative and prophylactic measures somewhat similar to those recommended for epizootic abortion. (1) antiseptic irrigations of all animals, diseased and healthy; (2) cleansing and disinfection of the external genitals, tail, and hind quarters; (3) disinfection of the cowsheds or other infected buildings, especially floors and gutters or channels; (4) isolation of diseased, suspected, or newly arrived animals; (5) cessation from breeding for a reasonable time, 6 to 8 weeks (3 months after abortion). The later or chronic stages do not appear to require any treatment."

Eradicating cattle ticks in California, W. M. Mackellar and G. H. Hart (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 283–300, pl. 1, figs. 4; Circ. 174, pp. 283-300, pl. 1, figs. 4*).—The authors first review the conditions obtaining in California prior to the commencement of eradication work in July, 1906. Upon investigation in that year San Luis Obispo, Santa Barbara, San Diego, Orange, Fresno, and Ventura counties were found to be heavily infested, and Tulare, Kern, Kings, Los Angeles, Riverside, San Bernardino, and Madera counties were found to be infested to a lesser degree.

In discussing the methods used in tick eradication in California, they consider the dipping solution, its preparation and use, and the dipping vats found most practical, namely, the swim vat, cage vat, and wade vat, with detailed illustrated plans for the construction of the first 2. "The dipping season in California begins about April 1 and must continue at 30-day intervals until 8 or 9 dippings have been made in order to clean the range in one season. During these 8 or 9 months it is necessary for the inspector to be present at each dipping and supervise the mixing of the dipping fluid in person." In order to prevent the entrance of infested Mexican live stock, a stock-proof fence is being erected along the international line.

"As a result of 4 years' work by the Bureau and state officials, California has only 9,315 square miles, instead of 69,755 square miles, of territory in quarantine for Texas-fever ticks. Of this area remaining in quarantine a large percentage is at present tick free and should soon be in a condition to be released. Of the original 153,476 cattle infested there remain under local quarantine 41,906. This number includes all herds on which the slightest infestation has been found in 1910, and many of these will no doubt be free with the close of this season's work. Half of this number are on one large ranch where eradication work has been slow on account of its size, the roughness of the range, and lack of coöperation from the owner.

"Prior to the inauguration of tick eradication in California condemnations for Texas fever were numerous in the abattoirs having federal inspection. During the past 2 years not a single condemnation for this disease has occurred in Los Angeles, where the majority of the cattle from the quarantined area are slaughtered. In the past year deaths from Texas fever on the ranges, where some years back losses annually reached into the thousands of head, have been so few as to be hardly worthy of notice. Our experience has proved that tick eradication is not only possible but with stringent laws and proper methods is very practicable. When attained it returns to the individual owner and the cattle industry at large many times more than the cost of its accomplishment."

Woody aster (Xylorrhiza parryi), O. L. PRIEN and L. C. RAIFORD (*Wyoming Sta. Bul. 88, pp. 3–20, figs. 4*).—This bulletin records information collected which indicates that the woody aster is the cause of serious loss of sheep in Wyoming. This plant grows only on alkalied gumbo-clay soils and, except for one recorded season, is always heavily infested with a fungus (*Puccinia xylorrhizæ*) which may add to the poisonous character of the plant.

Aster poisoning is characterized by lassitude, difficult respiration, muscular weakness, bloat, and final prostration. From 90 to 100 per cent of the animals affected die. The duration of the illness is from a few hours to several days. Gastro-enteritis results from fermentation of ingesta acting an an irritant; a general passive congestion is due to weak and impeded heart action, and in part by reason of diaphragmatic pressure on the lungs produced by tympany. There is an albuminoid degeneration of the liver and kidneys due to the precipitation of proteids by a toxin or toxins The treatment is purely symptomatic and is not uniformly successful. It consists in the administration of stimulants in small doses, carminatives, and antiferments.

The results of feeding-pen experiments are reported as follows: "Although purged, and fasted for a day, before placing in the feeding pens, the sheep persistently refrained from eating the growing plant other than in a few instances. After nibbling of it slightly they would exhibit considerable lassitude and dejection and thereafter avoid it entirely. A young ewe, taken from the reserve and penned May 22, ate of the aster somewhat on May 23 and again on May 24 and on the morning of May 25 was found dead. An old wether, placed in the feeding pen May 31, after the usual preparation, avoided eating the plant for a time, but finally ate of it freely, dying June 2. . . .

"A young ewe and an old wether, both freshly penned June 11, were given small amounts of the dried plant on June 15. They were allowed to eat as freely of it as they wished on June 16 and 17 and they did seem to relish it more than had been the case with the growing plant. On June 17 the young ewe died, while the old wether was in a dying condition that evening, which terminated during the night."

Immunization of goats against Malta fever, H. VINCENT and COLLIGNON (*Compt. Rend. Soc. Biol. [Paris], 69 (1910), No. 34, pp. 468–470*).—Results of tests with the vaccine prepared by the author (by taking an emulsion, in physiological salt solution, of a 3-day-old gelatin culture of *Micrococcus melitensis* and treating it with ether and agitating, then evaporating off the ether and heating at 38° C.) on young goats are reported. The results obtained were considered good.

Some recent experiments on infectious anemia of the horse, M. FRANCIS and R. P. MARSTELLER (*Amer. Vet. Rev., 39 (1911), No. 2, pp. 132–147*).—This is a report of studies conducted in continuation of those reported in Bulletin 119 of the Texas Station, previously noted (E. S. R., 20, p. 1084).

A horse, which was kept for 2 years in a small pasture with several infected horses and mules, did not become infected, although it ate from the same manger, drank from the same trough, and grazed with them. At the end of 2 years the horse was injected with 3 cc. of blood from an infected mule, a high fever developing on the twelfth day and again on the twenty-third day, which proved fatal.

In a second experiment 4 oz. of blood drawn from the jugular vein of the horse mentioned above and given by mouth to a healthy horse on November 26 produced the disease but did not prove fatal. Four oz. of blood drawn on January 16 from the animal infected November 26 just at the close of the fifth reaction and injected into a healthy horse caused its death on April 10. Four oz. of blood from the horse which died April 10 was given by mouth on March 25 to another horse but failed to infect.

In a third experiment large numbers of larvæ of the cattle tick (*Margaropus [Boophilus] annulatus*), the progeny of females which engorged on an infected horse, were applied and attached to an uninfected horse but failed to produce the disease. In a fourth experiment bisulphate of quinin administered by mouth to a 10-year-old mule appeared to arrest the fever. In a fifth experiment atoxyl was administered but failed to be of value. In a sixth experiment a 12-year-old mare that was subcutaneously inoculated with 15 cc. of porcelain-filtered blood from a mule the blood of which was known to be virulent, developed the disease; trypanred was then injected intravenously but apparently had no value as a curative agent. In the seventh and last experiment here reported the intravenous injection of trypanblue failed to arrest the disease.

Temperature tables accompany the reports.

Observations on bursatti [summer or rain sore], C. L. ROADHOUSE (*Amer. Vet. Rev., 38 (1910), No. 3, pp. 376–382*).—The author, after detailing his clinical findings with this disease, concludes "that he was successful in treating bursatti by excising the diseased tissues as completely as possible, followed by the application of antiseptic solutions and dusting powders; that strong solutions of formaldehyde prove effective in checking the secretions and excessive granulations, without noticeable ill effects to the animal; and that animals suffering with the extensive forms of the disease can be treated more successfully by removing them to cool climates where the disease is not apt to recur." In no case were filaria found in the blood.

Observations upon equine colic, P. SPEISER (*München. Tierärztl. Wchnschr., 55 (1911), No. 6, pp. 87–89; abs. in Vet. Rec., 23 (1911), No. 1190, p. 696*).—Among 65 colic cases treated by the author during the year were 6 fatal cases of verminous embolism of the colic arteries caused by *Strongylus armatus.*

In one case death occurred after 3 days, while the other 5 extended over periods of from 16 to 23 days.

Investigations of equine piroplasmosis in the Government of Ryazan in 1908, A. W. Belitzer (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 3–4, pp. 214–238; abs. in Jour. Trop. Vet. Sci., 5 (1910), No. 4, pp. 624–628*).—The outbreak of this disease in 1908 first occurred on May 11, the greatest number of cases appearing from May 19 to 24. "Out of 115 animals attacked 89.5 per cent were imported from the steppes and only 10.5 per cent locally bred. Of the former 58 per cent were attacked in their first year, 34 per cent in their second year, and 7 per cent in their third year after importation." A complication with colic was observed in 108 of 115 sick horses. The virulence of the outbreak, which has been found to be variable in former years, was as great at the beginning of 1908 as at the end.

"In the treatment considerable success followed intramuscular injections of perchlorid of mercury alternated with 5 gm. doses of calomel in ball. Five tenth gm. doses of atoxyl subcutaneously also appear to act satisfactorily together with salicylate of mercury in 0.5 gm. doses in ball."

Dermacentor reticulatus appears to transmit the disease in the northern part of Russia and *Hyalomma aegyptium* in the southern part.

The treatment of piroplasmosis of horses, A. W. Belitzer (*Abs. in Bul. Inst. Pasteur, 9 (1911), No. 5, p. 218*).—Two horses experimentally inoculated with the virus, and injected with trypanblue, 1 receiving 4 injections and the other 5 injections of 100 cc. of a 1 per cent solution, were not infected while the check animal succumbed to a grave form of the disease.

Poultry diseases and their treatment, R. Pearl, F. M. Surface, and M. R. Curtiss (*Maine Sta. Doc. 398, pp. IX+216, figs. 49*).—This is a compilation and digest of information regarding the commoner diseases of poultry, their diagnosis, etiology, treatment, and prognosis.

The nematodes parasitic in the alimentary tract of cattle, sheep, and other ruminants, B. H. Ransom (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 127, pp. 132, figs. 152*).—In this paper the author describes the various species of nematodes occurring in the alimentary tract of ruminants in detail for purposes of comparison. Illustrations showing the characteristics accompany the descriptions of the more important species. About 50 species which have been reported as parasitic in the alimentary tract of ruminants are listed, not less than 30 of these being known to occur in this country.

The methods of collecting and preparing specimens and the structure of nematodes parasitic in the alimentary tract of ruminants are first dealt with. The greater part of the work is taken up by keys to and descriptions of the families, genera, and species. Under each species the author gives the synonymy, specific diagnosis, hosts, location, locality collected, life history, and means of control, so far as known. The work concludes with a compendium of species arranged according to hosts.

Pulmonary distomiasis, H. Hanson (*Abs. in Amer. Vet. Rev., 39 (1911), No. 3, pp. 314, 315*).—The occurrence of the lung fluke (*Paragonimus westermanii*) in cats at Milwaukee, Wis., is reported. Three other reports of the occurrence of this parasite in the United States are mentioned, namely, in hogs at Cincinnati, Ohio, in cats at Ann Arbor, Mich., and in dogs at Columbus, Ohio.

The pharmacology of sulphur and its compounds, Wild (*Merck's Rpt., 20 (1911), No. 3, p. 61*).—A discussion in regard to the various uses of sulphur in medicine. A comparison is made with other drugs used for some of the same purposes.

RURAL ECONOMICS.

Recent immigrants in agriculture, A. E. Cance (*Washington: Govt., 1911, pp. 75*).—This is an abstract of the report of the Immigration Commission on recent immigrants in agriculture in the United States which shows the scope, method, and purpose of the investigation, a general sociological and economic survey of the immigrants in rural communities, the different races in agriculture, their conditions of employment, housing conditions, standard of living, etc.

Immigrant rural communities, A. E. Cance (*Survey, 25 (1911), No. 15, pp. 587–595*).—The author, who was in charge of the report issued by the Immigration Commission in 1910 relative to recent immigrants engaging in agriculture in the United States (see above), discusses at length the history, economic characteristics, social progress, and institutions of the rural immigrant in the United States.

It is pointed out that about one-fourth of all male breadwinners of foreign parentage were engaged in agricultural pursuits in 1900, although a greater part of them were of the older immigration who settled in the Middle West years ago and who have now become thoroughly Americanized and have made successful and prosperous farmers. In the East and South, where the foreign rural groups are new, infrequent, and unsettled, they have yet to prove their fitness generally for agricultural pursuits.

It is shown that the immigrant as a farmer or permanent farm laborer generally becomes a real economic factor in rural pursuits, but as a seasonal agricultural laborer—that is, one who lives in the city during the winter and works on the farm for only a few months during the summer, usually in the fruit and vegetable districts—he amounts to no more than a casual economic interest to the community.

The author directs most attention to the south Italians and gives illustrations of where particular groups of them have settled in Louisiana, Texas, North Carolina, New Jersey, New York, and Rhode Island. Each family has purchased a few acres of land, which, as a rule, had been deserted by Americans or had never been brought under cultivation, and by reason of their specialization, intensive farming, and cooperative marketing, their returns have been fairly remunerative. "The hundreds of little berry farms, vineyards, or sweet potato or pepper fields which make these Italian communities real oases in a waste of sand and lowland, bear unmistakable testimony to the ability of the much-maligned south Italian to create wealth and to make progress materially, morally, and politically under rural conditions."

An important economic feature is illustrated by a cooperative marketing association at Independence, La. Whereas individual growers formerly shipped their berries to commission merchants in Chicago and neighboring cities with unsatisfactory and sometimes ruinous results, the berries are now sold to platform buyers f. o. b. Independence with gratifying results. "During the spring of 1910 the association sold $357,639 worth of berries for its members."

It is found that the Hebrew is not adapted by training or tradition to become a pioneer farmer, and his success is confined to those who have been farmers abroad or have had successful training or experience in the United States previous to permanent settlement.

Small holdings (*Bd. Agr. and Fisheries* [*London*], *Ann. Rpt. Proc. Small Hold. and Allot. Act* [*etc.*], *1910, pp. 71*).—The Board of Agriculture and Fisheries, in making its report for 1910 relative to the administration of the small holdings and allotments act, shows that while it has experienced some difficulty in the administration of the work, considerable progress has been made during the past year in satisfying the demand for small holdings.

On December 31, 1910, 89,253 acres had been actually acquired or agreed to be acquired for small holdings by county councils in England and Wales, of which 53,642 acres had been purchased for £1,695,836 and 35,611 acres leased for rents amounting to £44,489. Of this land 65,923 acres had been actually let to 4,846 individual small holders, and 52 acres sold to 7 small holders. It is regarded as significant that such a small percentage of the applicants desired to purchase holdings.

In addition to the text, tables are given showing in detail the work of the board regarding applications for small holdings, rents, loans or other advances, compulsory orders, voluntary schemes, etc.

The Burwell small holdings after four years of tenancy, J. H. Diggle (*Jour. Bd. Agr.* [*London*], *18* (*1911*), *No. 1*, *pp. 1–9*).—This article reports the progress made during 4 years' tenancy and reviews the work with special regard to the employment of labor, the productivity of the soil, the output of stock and produce, and the economic result generally of the conversion of a large Cambridgeshire estate into small holdings and allotments.

It is shown that the estate contained 917 acres and was let to 80 tenants in 1906. Previous to that time it was formed at a loss. Now it is self-supporting and a margin is available to meet the cost of small improvements and progressive equipment. The following returns indicate the success of the tenants since the division of the estate and their entry on the land:

Census of live stock on the Cambridgeshire estate.

	Date.	Horses.	Cattle.	Pigs.	Poultry.
Live stock owned on entry	1906	33	66	122	267
Live stock owned at Michaelmas	1908	49	171	296	521
Do	1909	48	206	249	637
Do	1910	46	214	332	529

Other tables are given illustrating the progress of the tenants in several ways. "The tenants, satisfied that their tenure is secure, and holding the land at a moderate rent, are encouraged to put their best into their work, and thus to reap the reward of their thrift and personal labor."

Cooperative agricultural societies in the United Kingdom (*Bd. Trade Labour Gaz.*, *19* (*1911*), *No. 1*, *pp. 7*, *8*).—It is pointed out that the main object of these agricultural societies is to enable the members more efficiently and profitably to carry on their daily occupation as individual farmers and producers, and they are classified as "productive" and "distributive" societies. The "productive" societies are occupied in buying, manufacturing, and selling the produce of individual members, and are confined chiefly to the dairy industry. The "distributive" societies are usually formed for the collective purchase and distribution of the seeds, manures, implements, etc., required by the members, and for the sale of cattle, eggs, poultry, etc., produced by the members.

The membership of the 653 societies in 1909 numbered 85,272 with a total share capital of £221,268. Their loan capital amounted to £232,158, and reserve and insurance funds to £165,161. The sales of the "productive" societies show an increase in 1909 over 1899 of 210.8 per cent and the "distributive" societies an increase of 309.1 per cent. About 66½ per cent of the total increase for the "distributive" societies has taken place in England and Wales, while 84.8 per cent of the increase for the "productive" societies is attributable to societies in Ireland.

Cooperative credit societies in the United Kingdom (*Bd. Trade Labour Gaz., 19 (1911), No. 1, p. 30*).—Of the 241 credit societies in the United Kingdom in 1909, 222 were in agricultural districts. The following table gives particulars of the societies making returns for the years 1905–1909, inclusive:

Status of cooperative credit societies in the United Kingdom.

	1905.	1906.	1907.	1908.	1909.
Number of societies making returns	221	238	249	240	241
Number of members	16,545	18,288	20,793	20,848	22,389
Total capital (share, loan, and reserve)	£131,764	£130,061	£135,100	£146,761	£157,861
Amount of loans advanced (including renewals)	66,668	77,629	74,598	70,817	72,874
Repaid (including interest)	55,734	65,443	69,015	75,386	77,923
Owing by borrowers (including interest)	87,384	95,282	105,092	105,149	102,888
Working expenses (including interest on capital)	5,550	5,157	5,607	5,929	6,677
Net profit (after allowing for interest)	953	825	1,217	1,004	1,119

Agricultural cooperation in Bavaria, T. W. Peters (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 121, pp. 833–837*).—The report discusses the actual workings of agricultural cooperation in Bavaria and points out that the principal objects are the granting of loans to farmers and investing their money, the storing and selling of farm products and other articles required by members of the agricultural societies, and the buying of farm machinery, fertilizers, implements, etc. The societies created for the purpose of carrying on the work are of 2 forms, one limiting the financial liability of its members to the amount of their shares, the other where each member is responsible with his entire property for the debts of the society.

The central association comprises 2,479 local cooperative loan societies of farmers, 217 dairy societies, and 18 others with a total membership of over 200,000. The total assets of the local societies in the association at the beginning of 1909 amounted to about $71,000,000. Loans to members for the year were $12,138,000, and investments made for members amounted to $5,402,000.

The agricultural storage houses have been found especially useful to small farmers in selling their products and in buying fertilizers, agricultural machinery, building material, etc. Other statistics and data are given relative to the agricultural loan banks, the live-stock associations, and other forms of cooperation among farmers.

Trade unions in Italy in 1909 (*Bd. Trade Labour Gaz., 19 (1911), No. 1, pp. 8, 9*).—The total membership of trade unions in Italy on January 1, 1909, was 843,811, a decrease of 9.7 per cent as compared with January 1, 1908. Of these, 405,149, or almost one-half of the membership, are connected with agriculture.

[Data on the progress of cattle insurances in France in 1910] (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 2, pp. 147–149*).—This article shows that in spite of the bad weather, the poor quality and high price of crops, and the increased mortality among cattle, a federation of French farmers had a very good financial year in 1910. While they paid out 80 per cent of the amount collected, the advance in capital was the same as the year before.

It is shown that the annual sum collected in 1906 amounted to 4,301.42 francs; in 1907 to 18,032.40 francs; in 1908 to 45,095.65 francs; in 1909 to 84,147.50 francs; and in 1910 to 118,540.25 francs.

Other facts and figures bearing on the rapid progress of the mutual insurance companies against the death of cattle and results from hail storms are also presented and discussed.

Agriculture in New Zealand, M. MURPHY (*New Zeal. Off. Yearbook 1910, pp. 745–775*).—The author calls attention to the superior opportunities for agricultural development in New Zealand by reason of its climate, uniform rainfall, and the fertility of its soil. Data as to various crops, live stock, and other farm products are reported and discussed.

Agricultural statistics in the British possessions, protectorates, etc. (*Bd. Trade [Gt. Brit.], Statis. Abs. Brit. Self-Gov. Dominions, Colonies [etc.], 1895–1909, No. 47, pp. 302–321*).—Tables showing the acreage in cultivation and the yield of each of the several cereal and root crops in the various British self-governing dominions, crown colonies, possessions, and protectorates in each year from 1895 to 1909, inclusive, are presented.

Annual agricultural statistics (*Statis. Agr. Ann. [Paris], 1909, pp. 356*).—This is a report of general agricultural statistics and of statistics as to agricultural imports and exports, for the year 1909, in France and various other countries of Europe.

Agricultural statistics for Norway, September 30, 1907, A. N. KIÄR (*Norges Off. Statis., 5. ser., 1910, No. 109, pp. 145, pls. 3*).—This volume reports on the land area of Norway and its application for agricultural purposes, the number and size of farms, crop yields, number and value of farm animals, etc. Several graphical charts with legends in Norwegian and French are included at the close of the volume.

Wages, rent, prices of stock, provisions, etc., highest market prices (*Statis. Reg. Cape Good Hope, 1909, pp. 197–203*).—These are statistical tables showing the ruling rate of wages among agricultural laborers, together with wages paid to laborers in other occupations in the various localities in the province of the Cape of Good Hope during the year 1909. The average monthly rent of a laborer's cottage or hut with garden in 25 localities of the province is found to be £1 65s. 4d., and the average monthly rent of a town lodging for a mechanic's family £2 8s. 10d.

Foreign crops, May, 1911, C. M. DAUGHERTY (*U. S. Dept. Agr., Bur. Statis. Circ. 19, pp. 12*).—This circular gives data as to condition of crops in foreign countries in May, 1911, together with tables showing total area production, and exports of grain in specified years.

AGRICULTURAL EDUCATION.

Educational agriculture, J. MAIN (*West. [Kans.] State Norm. School [Bul.], 2 (1910), No. 3, pp. 74, figs. 10*).—This is a discussion of the problem of secondary agriculture with a view to the proper fixing of the upper and lower limits of high-school agriculture and thereby largely determining the work of the elementary and higher institutions. The school chosen in the treatment of this subject "is not an agricultural school in any sense or degree other than that in which any high school with a rural environment or a rural constituency should be agricultural."

The author has divided the subject into 3 parts. Part 1 deals with the limitations of the field as a realm of knowledge. He believes that nature study should be strictly cultural, agriculture strictly economic, and science strictly scientific, and that an agricultural or scientific education which has regard for a child as a future citizen must consider the necessity of all 3 factors. The present strength of the movement for agricultural instruction in the schools is economic, and according to part 2, which deals with organization and is chiefly a psychological study as a means to solving the problem, it is held that educators should put more stress on the moral and racial significance of the reform and thus aid in the idealization of the vocation as it should be idealized to be worthy of a place in an educational system. Chapter 3, on "genetic psychology as an aid in organization," consists of an investigation into the development of the human mind from the earliest years until maturity in order to determine the principles which govern in the organization of agriculture in a curriculum. The charts deal with such matters as a high-school course in science and agriculture, an agricultural calendar for a high school covering several years' work, and a high-school course in agriculture and related sciences showing the place of industrial and vocational electives. Part 3 deals with the equipment of the laboratory, plats and grounds, and agricultural literature. Excerpts from the works of many leaders in educational thought are found in almost every chapter.

Reports of Danish agricultural instructors (*Ber. Landbr. Min. Landokonom. Konsulentvirks., 21 (1909), No. 2, pp. 228*).—The reports of the various instructors employed by the Danish government, directly or indirectly, are given in the volume, and the more interesting and important phases of their educational and inspection work are briefly discussed.

Fundamentals of agriculture, edited by J. E. Halligan (*Boston, New York, and Chicago, 1911, pp. XIV+492, figs. 269, dgms. 19*).—This is an elementary text-book for which the editor has secured chapters from many different authors, as follows: Means of Promoting Agricultural Life in America, by K. L. Butterfield; The Soil, by A. R. Whitson; Plant Life, by E. A. Bessey; Manures and Fertilizing Materials, by the editor; Farm Crops, by L. Carrier, A. D. Shamel, W. R. Dodson, O. D. Center, H. P. Agee, E. H. Jenkins, the editor, S. E. McClendon, and C. V. Piper, each dealing with some particular crop or group of crops; Trees and the Garden, by C. P. Halligan, L. Carrier, G. E. Stone, and C. A. Keffer; Plant Diseases, by H. R. Fulton; Insects and Birds, by G. W. Herrick, W. Newell, A. L. Quaintance, A. W. Morrill, and E. H. Forbush; Live Stock and Dairying, by E. S. Good, J. E. Wing, C. S. Plumb, D. J. Lambert, F. W. Woll, and the editor; Feeds and Feeding, by the editor and W. H. Dalrymple; Farm Management, by F. W. Card; Farm Machinery, by L. W. Chase; The Disposal of Sewage on the Farm, and Earth Roads, by J. B. Davidson; The Country Home, by the editor; and Truck Gardening, by G. L. Tiebout. Each topic in the book is treated very briefly and all are arranged in such a manner as to secure a logical development of the subject of agriculture.

Text-book of Egyptian agriculture, edited by G. P. Foaden and F. Fletcher (*Cairo: Govt., 1910, vol. 2, pp. VI+321–878, pls. 11*).—This is the second volume of the text-book issued by the Egyptian ministry of education (E. S. R., 21, p. 91). It contains a chapter each on farm seeds and rotation of crops, by W. Cartwright; a chapter on farm crops, including cotton, by G. P. Foaden; flax and til, cereals, sugar, pulse, fodder, and wet-land crops, by W. Cartwright, and minor crops, by G. Bonaparte; a chapter each on vegetables and fruits, by G. Bonaparte; a chapter on farm pests, including fungoid diseases, by W. L. Balls, and injurious insects, by F. C. Willcocks; a chapter on farm animals, by J. S. McCall; and one on dairying, by W. Cartwright. Six appendixes contain data on crops and areas, census of date palms, exports from Egypt, imports into Egypt, meteorological data, and weights and measures.

A course of practical work in agricultural chemistry for senior students, T. B. Wood (*Cambridge, England: School Agr., 1911, pp. 56*).—This course of study is the outcome of 17 years' experience in teaching a class of senior students in the University of Cambridge. It has been used for the last 10 years in the form of typewritten sheets, which were given out to the class from day to day and revised from year to year. The course outlines methods of sampling and analyzing soils and plants, of determining nitrogen, phosphoric acid, potash, lime, magnesia, sand, humus, and clay, of estimating the plant food values of commercial and farm fertilizers, and of analyzing milk, feeds, oils, and other agricultural products.

Planting and cultivating corn, D. W. Working (*W. Va. School Agr., 1 (1911), No. 6, pp. 90–110, figs. 8*).—Eight lessons are outlined on the planting and cultivating of corn. Each lesson is accompanied by a laboratory exercise and one or more references to helpful literature.

Suggested course of study in nature-study-agriculture for the one-room rural schools of Illinois (*School News and Pract. Ed., 24 (1911), No. 10, pp. 445–452*).—This course was prepared by a committee appointed for the purpose at the first nature-study-agriculture conference at the University of Illinois, in March, 1910. It is arranged by months for the 8 years of the elementary school.

School and home gardening, S. C. Kelleher and N. H. Foreman (*[Philippine] Bur. Ed. Bul. 31, 1910, pp. 45, figs. 8, pls. 14*).—Gardening, as outlined in this bulletin, is prescribed for all elementary schools in the Islands. The authors discuss the objects of school gardening, the divisions of the work into school and home gardens, plant nurseries, and flower and ornamental plant culture, give detailed instructions for selecting a site, fencing, planting, and platting the entire garden, preparing the soil, planning and mapping the pupil's plat, choosing plants and seeds, keeping a record, use and care of tools, transplanting, time of planting, care of plants, disposition of products, and the germinating bed, directions for growing some of the common garden vegetables, procuring seed for the next crop, keeping seeds until planting time, for doing work at barrio schools, decorative gardening, and tree planting. A plan of an individual garden is suggested, and a report on school-garden work in Union Province including the object, local interest, and progress of gardening in the province, together with the details of the supervisor's method of conducting gardening for primary schools, is given.

Arbor day, R. H. Schauffler (*New York, 1909, pp. XXIX+360*).—This is a collection of essays and other articles, exercises, and poems concerning Arbor Day and its history, observance, and significance, together with similar contributions on spring, trees, flowers, and conservation.

Equipment for teaching domestic science, Helen Kinne (*New York: Teachers Col., 1910, pp. 100, pl. 1, figs. 63*).—The author discusses the problems that are met in planning a domestic science equipment for cookery, table setting and service, housework, laundering and home nursing, suggests practical solutions that have been worked out through experience, and gives a description of what is done in some of the schools and colleges of this country. A chapter each is devoted to the planning for rooms in a new building and the refitting of rooms used for other purposes, the cooking laboratory, the dining room, laundry and equipment for home nursing, the purchase and care of equipment, the total cost of equipment, the cost of maintenance, and the household arts building, Teachers College, Columbia University.

Federal legislation, regulations, and rulings affecting agricultural colleges and experiment stations (*U. S. Dept. Agr., Office Expt. Stas. Circ. 111, pp. 24*).—This is a revision of Circular 68 (E. S. R., 18, p. 688), including statements concerning the classification of station accounts and the requirements of experiment station accounting.

MISCELLANEOUS.

Twenty-sixth Annual Report of the Bureau of Animal Industry, 1909 (*U. S. Dept. Agr., Bur. Anim. Indus. Rpt. 1909, pp. 407, pls. 15, figs. 10*).—This contains a report of the Chief of the Bureau for the fiscal year ended June 30, 1909, numerous articles abstracted elsewhere in this issue, and a list of the publications of the Bureau during 1909. An appendix contains the rules and regulations of the Secretary of Agriculture relating to animal industry issued during 1909.

Annual Report of Hawaii Station, 1910 (*Hawaii Sta. Rpt. 1910, pp. 64, pls. 8, figs. 4*).—This contains the organization list, a summary by the special agent in charge as to the investigations of the year, and reports by the entomologist, horticulturist, chemist, and agronomist. The experimental work recorded is for the most part abstracted elsewhere in this issue.

Twenty-second Annual Report of Maryland Station, 1909 (*Maryland Sta. Rpt. 1909, pp. XXXVI+306, figs. 96*).—This contains the organization list, a report by the director on the work and expenditures of the station, a financial statement for the fiscal year ended June 30, 1909, and reprints of Bulletins 129–136.

Twenty-third Annual Report of Maryland Station, 1910 (*Maryland Sta. Rpt. 1910, pp. XXIV+320, figs. 107*).—Data corresponding to the above are presented for the fiscal year ended June 30, 1910, the bulletins reprinted being Nos. 137–145, previously noted.

Twenty-first and Twenty-second Reports of New Hampshire Station, 1909–10 (*New Hampshire Sta. Bul. 151, pp. 72*).—This contains the organization list; a report of the director for the biennial period ended October 31, 1910; financial statements for the fiscal years ended June 30, 1909, and June 30, 1910; departmental reports, the experimental work of which is abstracted elsewhere in this issue; a list of the publications of the station from 1888 to 1908; and meteorological data abstracted on page 316 of this issue.

Twenty-third Annual Report of Rhode Island Station, 1910 (*Rhode Island Sta. Rpt. 1910, pp. 349–395+VIII*).—This contains the organization list, a report of the director on the work of the station during the year, including a summary of meteorological observations of the year abstracted on page 316 of this issue, and a financial statement for the fiscal year ended June 30, 1910.

Experiment Station Work, LXIII (*U. S. Dept. Agr., Farmers' Bul. 451, pp. 24, figs. 6*).—This number contains articles on the following subjects: Sterilizing tobacco-plant beds, conditions essential to clover growing, curing clover hay, the velvet bean, quality and conformation of draft horses, and care of brood mares and newborn foals.

Government assistance to agriculture in Sweden, 1905–1909, F. EGERSTRÖM (*Meddel. K. Landtbr. Styr. [Sweden], 1910, Nos. 160, pp. 1–766+XII; 161, pp. 767–1606+VII*).—This report describes in a comprehensive manner the various measures taken by the Swedish Government from 1905 to 1909 for the encouragement of agriculture.

NOTES.

Arkansas University and Station.—New members of the board of trustees include H. B. McKenzie of Prescott, C. C. Reid of Little Rock, Arthur Turner of Jonesboro, and Edgar Brewster of Pine Bluff. W. H. Cravens has been appointed secretary to the board to succeed J. E. Neelly, and J. Walker treasurer. Paul Hayhurst, assistant entomologist, has been appointed professor of entomology and entomologist.

University of California.—The division of agricultural education has begun the publication of *The Junior Agriculturist*, a semimonthly leaflet for boys' and girls' clubs.

Colorado College and Station.—T. J. Ehrhart of Centreville, and Charles Pearson of Durango, have been appointed to the board of control, vice E. H. Grubb and B. F. Rockafellow.

The station is giving increased attention to irrigation and drainage problems, including irrigation investigations in cooperation with this Office. Considerable irrigation engineering apparatus has been acquired for the work.

The station now has five field men located in various sections of the State giving their time to the special agricultural interests, such as fruit growing, insect pests, dry farming, potato growing, etc. These men cooperate with the farmers in carrying on the investigations, hold meetings for the benefit of the farming communities, write articles for agricultural journals, and otherwise render service to communities where their work is carried on.

Connecticut Storrs Station.—Dr. J. N. Currie has been appointed chemist of the cheese investigations.

Georgia College.—L. E. Rast has been appointed instructor in agronomy.

Idaho University and Station.—D. W. Clark of Pocatello has been appointed a member of the governing board in place of O. E. McCutcheon. F. L. Kennard has succeeded O. M. Osborne as assistant agronomist in the station, and Karl J. Theige has been appointed assistant bacteriologist. E. J. Iddings has assumed the duties of animal husbandman in the station and professor of animal husbandry in the college.

Iowa College and Station.—A four-year course in agricultural education has been added to the division of agriculture for the purpose of training teachers for agriculture and domestic science work in the secondary schools. The recent legislature authorized the establishment of departments in agriculture and home economics in 40 high schools and allotted $500 as special State aid to each of these schools. It is stated that much difficulty is at present being experienced in obtaining competent instructors along these lines and that the establishment of the course is in recognition of the demand upon agricultural colleges for teachers especially trained for the secondary schools. At the present time comparatively few of the agricultural graduates of the college enter teaching work, not over 10 per cent of the last class of 78 contemplating it. A. V. Storm has been appointed head of the new department.

Recent appointments include Miss Winnifred S. Gettemy, of the Illinois Woman's College, as professor of applied design in the home economics course; B. W. Hammer, of the Wisconsin State Hygienic Laboratory, as dairy bacteriologist, vice John H. Gordon, resigned to engage in commercial work; and F. W. Beckman, a newspaper writer of the State, as editor of the college and station publications.

Kentucky Station.—Recent appointments include J. H. Kastle as research chemist, H. H. Jewett and H. R. Niswenger as assistant entomologists and botanists, and L. S. Corbett as assistant in animal husbandry.

Massachusetts College and Station.—The trustees have voted to dissolve the relationship with Boston University by which the college has, since 1875, constituted the college of agriculture of the university. Plans were adopted for the formal conveyance of the property of the college to the State in accordance with a recent state law declaring the college a State institution. It was also decided to charge tuition to students in the winter courses and to nonresidents of the State who enter the regular four-year course after 1912.

A total of 17 new appointments to the faculty has been announced. Among these are Robert J. Sprague, of the University of Minnesota, as head of the division of the humanities and professor of economics and sociology; Edward M. Lewis as assistant professor of English and assistant dean; Frederick L. Yeaw, of the California Station, as assistant professor in market gardening, vice Charles S. Heller, resigned; Dr. George E. Gage, of the Maryland Station, as assistant professor of animal pathology; Arthur K. Harrison as instructor in landscape gardening, vice John Noyes, resigned; Elvin L. Quaife as instructor in animal husbandry; Frederick A. McLaughlin, a 1911 graduate of the college, as assistant in botany; Herbert J. Baker, also a 1911 graduate, as assistant in the department of agronomy and secretary to the director of the station; and R. W. Ruprecht as assistant chemist in the feed and fertilizer inspection department in the station.

The chemical department of the college has been reorganized under the direction of Dr. J. B. Lindsey of the station, with Dr. Charles Wellington as professor of analytical chemistry and Dr. Charles A. Peters, formerly of the University of Idaho, as professor of inorganic and soil chemistry.

Michigan College and Station.—John W. Beaumont and Jason Woodman have been appointed to the governing board, vice W. L. Carpenter and W. J. Oberdorffer, taking office January 1, 1912. George Bouyoucos, Ph. D., has been appointed research assistant in soil physics, and F. Hasserlink van Suchtelen, Ph. D., research assistant in bacteriology. A soil house has been constructed for the soil investigations conducted under the Adams Act, and a piggery has been completed for the manufacture of the Dorset-Niles hog cholera serum. An addition to the chemical laboratory is in process of erection.

Minnesota University and Station.—*Minnesota Farm Review* announces the appointment of R. M. Washburn, of the Vermont University and Station, as associate professor of dairy husbandry and dairy husbandman, who entered upon his duties September 1.

Missouri University and Station.—J. A. Ferguson, assistant professor of forestry and forester in the Pennsylvania College and Station, has been appointed professor of forestry. The college owns 50,000 acres of forest land in south Missouri, and these will be utilized in connection with the forestry instruction.

A. J. Meyers, of Howell, Mich., has been appointed superintendent of the short winter courses and assistant to the dean, with the rank of assistant professor. Other appointments include the following assistants: E. G. Woodward and W. W. Wobus in dairy husbandry, the latter vice E. G. Maxwell, resigned; W. E. J. Edwards, a graduate of the Ontario Agricultural College, in animal husbandry; J. P. Dunn and E. C. Hall in the state soil survey work; C. A. Le Clair in agronomy; E. E. Vanatta in agricultural chemistry in the station; and O. R. Johnson in farm management. Walter E. Camp has been appointed research assistant in veterinary science in connection with the Adams fund project on the investigation of immunity to hog cholera. P. L. Gainey has been appointed instructor in botany. E. S. Vanatta has resigned as assistant in the state soil survey to accept a position with the Bureau of Soils of this Department.

Montana Station.—D. C. Cochrane, assistant in animal nutrition in the Pennsylvania Institute of Animal Nutrition, has been appointed assistant chemist and entered upon his duties August 1.

New Hampshire College and Station.—Fred Rasmussen has resigned as professor of dairying in the college and dairyman in the station to become professor of dairy husbandry at the Nebraska University and dairyman at the Nebraska Station September 1, vice A. L. Haecker, resigned.

New Jersey Stations.—The horse barn, dairy barn, two silos, and several smaller structures were destroyed by fire July 11, causing a loss of about $25,000. A considerable supply of hay and grain was consumed, but the live stock was saved. The loss was covered by insurance and the work of rebuilding is already under way. It is expected that concrete structures will be erected.

J. G. Lipman has been appointed director of the stations. Miner S. Macomber has resigned as assistant chemist in the State Station and has been succeeded by Willis H. Pearson.

New York State Station.—J. F. Barker, assistant professor of soils in the Iowa College, has accepted a position as soils expert, and began his duties in July. W. H. Alderman, associate horticulturist, has accepted the professorship of horticulture at West Virginia University. He has been succeeded by Richard Wellington, formerly assistant horticulturist, and who in turn is succeeded by Charles B. Tubergen, a 1911 graduate of the Michigan College.

Ohio University and Station.—Prof. Alfred Vivian has been designated acting dean of the college of agriculture for the coming year during the absence of Dean Price in Europe. Ernest D. Waid, assistant professor in agronomy, has resigned to accept a position with the agricultural extension department of the Massachusetts College.

An appropriation of $7,500 was made by the recent legislature to establish a poultry plant.

A country church conference was held at the university July 25–28. The morning sessions were given over to lectures on farm crops, soil fertility, and horticulture, and the afternoon and evening sessions to the discussion of economic, sociological, and religious topics.

The State appropriations to the station for the biennial period 1911–12 aggregate $396,590. Of this $65,000 is for administration, $33,685 for agronomy, $40,000 for animal husbandry, $17,000 for botany, $58,000 for extension work, $13,600 for entomology, $19,400 for forestry, $37,000 for soil investigations, $8,600 for chemistry, $31,000 for horticulture, $15,000 for nutrition, $17,200 for dairying, $34,750 for new buildings, equipment, etc., and $6,355 for the purchase of land.

Recent appointments at the station include J. G. Humphrey, M. F. M. Beegle, and J. E. Mensching as assistant chemists, the first-named in connection with the soil investigations and the others in the nutrition investigations. A. C. Whittier, assistant in nutrition investigations, has resigned to engage in commercial work.

Oregon College and Station.—T. D. Beckwith, of the North Dakota College and Station, has been appointed professor of bacteriology and bacteriologist, vice Dr. E. G. Peterson, whose resignation has been previously noted. Dr. H. E. Ewing has been appointed laboratory assistant, and A. L. Lovett field assistant in entomology; F. R. Brown, F. C. Bradford, and F. V. Tooley field assistants in horticulture; James Speidell instructor in horticulture; George Reiben horticulturist of the Eastern Oregon substation at Union; Leslie Beaty horticulturist at the Hermiston substation; and F. D. Bailey field assistant in botany and plant pathology.

Porto Rico Station.—Winthrop V. Tower has resigned as entomologist to accept a position with the Porto Rico Board of Agriculture.

Rhode Island Station.—E. F. Southwick, assistant in agronomy, and Miss Elizabeth E. Amison, assistant biologist, have resigned. Fred J. Godin has been appointed assistant floriculturist in the college and station, vice E. A. Mallette, resigned to take up commercial work.

South Carolina Station.—The appointments are announced of W. B. Aull as assistant botanist and F. G. Tarbox, jr., as assistant in agronomy.

South Dakota Station.—Fred D. Fromme has succeeded Orlando E. White as assistant in botany.

Texas Station.—The resignations are noted of J. W. Carson as assistant to the director and State feed inspector, taking effect September 1, and N. C. Hamner as assistant chemist. B. Youngblood, assistant agriculturist in the Office of Farm Management of this Department, has been appointed director and entered upon his duties August 15.

Virginia Station.—W. K. Mallory, assistant dairy husbandman, has resigned to accept an appointment with the Dairy Division of this Department.

Washington College and Station.—O. M. Morris has been appointed professor of horticulture and horticulturist, vice W. S. Thornber, whose resignation has been previously noted. George S. Olson has been promoted from assistant chemist to chemist of the station. H. P. Barss, instructor in botany in the college, has been added to the station staff as assistant plant pathologist, half of his time to be devoted to Adams fund projects in plant pathology. E. F. Gaines has been appointed assistant cerealist in the station.

West Virginia University and Station.—A school of agriculture and domestic science of secondary grade has been formally organized. For men there is a 4-year course, a short course consisting of 2 winter quarters, and a winter "farmers' course" of about 2 weeks consisting of popular lectures, demonstrations, and exercises for men over 21 years of age. The 4-year course consists of 3 years of 2 quarters each (for the current year extending from September 18, 1911, to March 22, 1912), and 1 year of 3 quarters. During this last year the work in agriculture is elective, and there is also an opportunity to take 3 hours each quarter of electives in other subjects. This course is planned for young men who expect to go back on farms, but it also contains sufficient work in English, mathematics, science, and German (2 years), to admit its graduates to the college of agriculture with only 2 entrance conditions.

In the short course all of the work is in agriculture and related sciences. The work of the first winter is the same for all students, but in the second winter students have the option of a group in dairying, a group in horticulture, and a group in animal husbandry.

For women there is a 3-year course in home economics, each year consisting of 2 terms of 12 weeks each as in the case of the first 3 years of the agricultural course. The regular academic work for women is the same as that for men, but instead of required work in agriculture they take cooking, sewing, hygiene, music, and home management. They may also take work in dairying, farm crops, and plant propagation instead of German in the third year.

J. H. Stewart has resigned as director, to take effect January 1, 1912, and will be succeeded by E. D. Sanderson. David Carleton Neal has been appointed assistant bacteriologist.

Wisconsin University.—A department of veterinary science has been established with Dr. F. B. Hadley as chairman of the department, as well as veterinarian to the station. A small amount of work has been given during the past few years to agricultural students along this line, but this will now be enlarged. The new department has offices, a dispensary, and dissecting and operating rooms in the new live stock pavilion.

K. L. Hatch has been promoted to the associate professorship of agricultural education and extension, and J. G. Halpin to that of poultry husbandry. Other appointments include F. B. Morrison as assistant to the dean and director, A. C. Burrill as assistant in economic entomology, F. J. Kelley as assistant in experimental breeding, T. J. McCarthy as assistant in horticulture, and L. H. Schwartz as assistant in poultry husbandry.

Vocational Agricultural Schools.—The Massachusetts legislature has recently made it possible for a vocational agricultural school to be established by a town or a group of towns formed into a district. If such a school is approved "by the board of education as to organization, control, location, equipment, courses of study, qualifications of teachers, methods of instruction, conditions of admission, employment of pupils, and expenditures of money," the town or district supporting it will be reimbursed by the State to the extent of one-half the maintenance cost which has been paid by local taxation.

Ten thousand dollars was also appropriated for aiding in the establishment of the vocational agricultural departments in selected high schools. These departments are to be subject to the approval of the board of education in all the particulars above cited in connection with the agricultural schools. Towns providing approved departments will be reimbursed to the extent of two-thirds of the amount of salary paid the agricultural instructor. This agricultural instructor must devote himself exclusively to the supervision of agricultural projects, to be carried out by his students chiefly at their homes, and to giving instruction in the various phases of agricultural science required for the successful understanding and prosecution of those subjects.

New Agricultural School in Nebraska.—At the last meeting of the Nebraska legislature a bill was passed providing for a new $100,000 agricultural school. The school is to be known as the Nebraska School of Agriculture and will be under the control and management of the board of regents of the University of Nebraska. It is to be located at Curtiss on a 20-acre campus within the city limits and will also own and use for demonstration and other purposes a 413-acre farm. The law provides for (1) one laboratory building, not less than 2 live stock barns, and the necessary sheds, pens, and inclosures, complete, at an estimated cost not to exceed $75,000; (2) furnishings not to exceed $10,000; and (3) necessary equipment, such as farm implements and live stock, $15,000.

Agriculture in Wisconsin Schools.—The Wisconsin laws of 1911 provide for State aid of $250 when a department of agriculture is established in connection with any free high school. If the department extends to three grades below the high school this sum is increased to $350.

Agriculture in North Dakota Schools.—At the recent session of the North Dakota legislature provision was made for the establishment and maintenance of a department of agriculture, manual training, and domestic economy in state high, graded, and consolidated schools. To derive aid to the extent of $2,500, each of these schools must, among other things, employ trained instructors in agriculture, manual training, and domestic science, and have within one mile of the school buildings not less than 10 acres of land suitable for a school garden and purposes of demonstration.

Provision was also made for the establishment of county agricultural and training schools and their joint maintenance by the State and the county wherein they are located. The yearly cost of maintenance of each of these schools is not to exceed $6,000 per year, of which the State pays one-half and the county the remainder.

Appropriations for District Agricultural Schools in Oklahoma.—Under the Oklahoma laws of 1911 the district agricultural schools at Warner, Tishomingo, Broken Arrow, Lawton, and Helena are each to receive state aid to the extent of $17,000 for 1912 and $19,000 for 1913, while the more recently organized school at Goodwell will receive during the same years $11,000 and $13,000, respectively.

Agricultural Education in Canadian Secondary Schools.—By a recent amendment to the regulations for agricultural education in high schools and continuation schools by the Ontario Department of Education, the duties of the teachers of agriculture under the ministers of agriculture and of education, respectively, are now clearly defined.

Local control is in the hands of an advisory agricultural committee composed of 4 members of the school board and 4 other persons who are actively engaged in agricultural pursuits. The agricultural teacher is hereafter to conduct classes not only in the high-school center to which he has been appointed, but at other centers selected by the minister of education on the application of their high-school or continuation-school boards. The minimum length of a school class in agriculture is to be 4 weeks. Shorter classes for farmers are provided under the authority of the minister of agriculture.

The minister of education has appointed Prof. S. B. McCready, of the Ontario Agricultural College, inspector of these classes and director of elementary agricultural education.

Agriculture in Latin America.—The June number of the *Bulletin of the Pan American Union* announces the inauguration last April of a government agricultural school in the Potopoto Valley at Sopocachi, near La Paz, Bolivia. Augustin Luna Pizarro, a practical agricultural engineer of wide experience and a noted botanist, is director of the institution. It is probable that a veterinary department will be added to this school later.

On April 1 there was inaugurated the School of Agriculture for the Southern Department of the Dominican Republic at San Cristobal.

The National Legislative Assembly of the Republic of Salvador has prescribed the duties and functions of the department of agriculture recently esatblished, as follows: Supervision and inspection of municipal and interdepartmental roads, establishment of produce exchanges, taking of the general agricultural census, collection of taxes on agricultural products, regulation of irrigation of lands, importation of new machinery for the cultivation and improvement of new agricultural products, establishment of fertilizer factories, analysis of lands, development of commerce in general, and the establishment of an information bureau.

EXPERIMENT STATION RECORD.

VOL. XXV. OCTOBER, 1911. No. 5.

Endowment for agricultural education and research, except from the federal and state governments, has been relatively quite small. This is especially the case in view of the fundamental position of agriculture and the avenue it opens for practical results which find application in everyday life.

Doubtless the aid which the state and national governments have given is responsible in part for this, and the further fact that the institutions devoted to it are mainly state institutions. The appeal has consequently not been made to private beneficence to the extent that it has in other classes of institutions. Agriculture has been regarded as one of the branches which the state and federal governments were taking care of, and until quite recently there has been no very widespread appreciation of any further needs of these institutions. However, private endowment for agricultural instruction commenced many years ago, and while it has not represented in the aggregate a very large amount, it has reflected the intelligent interest of a considerable number of persons.

The propriety of public aid to agriculture found early advocacy in the well-known words of President Washington in his annual message to Congress in 1796 when he said: "It will not be doubted, that, with reference either to individual or national welfare, agriculture is of primary importance. In proportion as nations advance in population and other circumstances of maturity, this truth becomes more apparent and renders the cultivation of the soil more and more an object of public patronage. Institutions for promoting it grow up, supported by the public purse; and to what object can it be dedicated with greater propriety?"

Many years were destined to elapse, however, before the practical realization of these views in public legislation, and in the interval the efforts of individuals, even though isolated and apparently insignificant, supplied numerous object lessons which doubtless paved the way to subsequent public action.

The first bequest for agricultural education in this country appears to have been that of Mr. Benjamin Bussey, of Roxbury, Mass. In a will signed July 30, 1835, 200 acres of his farm in Roxbury and half of the income of about $300,000 were bequeathed to Harvard College on condition that there should be established on the farm "a course of instruction in practical agriculture, in useful and ornamental gardening, in botany, and in such other branches of natural science as may tend to promote a knowledge of practical agriculture and the various arts subservient thereto." Because of other conditions in the will the organization of this work was not attempted until 1870, when a considerable additional sum was granted to Harvard College by the Massachusetts Society for Promoting Agriculture "for the support of a laboratory and for experiments in agricultural chemistry to be conducted on the Bussey estate."

Operations were begun in 1871 under the name of the Bussey Institution, offering undergraduate instruction as a school of agriculture and horticulture, and giving considerable attention to experimental work as well. In 1908 the scope of the institution was changed to that of graduate instruction and research in applied biology, the subjects so far taken up being economic entomology, plant and animal genetics, and comparative pathology.

Another will made at about the same period as the Bussey bequest, and resembling it as regards the active interest manifested in agricultural education by its maker many years before the establishment of any American agricultural school or college, was made public on the death of Mr. Oliver Smith, of Hatfield, Mass., in 1845. This will provided for a number of educational and charitable enterprises, but among others for the establishment in Northampton, Mass., of an agricultural school and "pattern" farm. The fund set aside for this purpose was not made available until a period of sixty years had elapsed, at which time it had accumulated to over three hundred thousand dollars. A secondary institution, known as Smith's Agricultural School, was opened to over one hundred students in the fall of 1908, and has since been in operation, with courses in agriculture and home economics as a leading feature of its curriculum.

An actual experiment in agricultural education was instituted in the winter of 1850–51 in the establishment of the Oakwood Agricultural Institute at Lancaster, New York. Funds for this enterprise were derived from the sale of two hundred shares of stock subscribed for by five gentlemen from Buffalo. The school was opened in April, 1851, using the buildings and farm of Judge Theodotus Burrell, the originator and promoter of the plan, but in the following winter financial reverses to the stockholders compelled the abandonment of the enterprise.

Three years later came the establishment of the New York State Agricultural College at Ovid. This institution by 1856 had raised by private contributions $40,000, and thereby became the recipient of a loan of a like amount from the State. A large farm was acquired at Ovid, a building erected to accommodate 150 students, and the doors opened December 5, 1860. The outbreak of the Civil War and other causes led to its suspension in April, 1861, and to its formal close in the following year.

Upon the passage of the original Morrill Act efforts were made to reopen the institution with the aid of a portion of the federal land grant to the State, but without success. Instead the legislature accepted an offer from Mr. Ezra Cornell of $500,000 and 200 acres of land with farm buildings in case the land grant should be devoted to an institution to be located at Ithaca, N. Y. Subsequently Mr. Cornell made an additional gift of $200,000, and the net result was the organization of Cornell University, with its college of agriculture.

The incorporation of the Maryland Agricultural College in 1856 is of interest, as this is the first institution of the sort still in existence to be established by voluntary contributions. Funds to the extent of about $50,000 were secured in this way from about five hundred residents of Maryland and a few nonresidents participating as stockholders. Land and buildings were acquired, and after three years of maintenance as a private enterprise state aid was enlisted.

The history of the Farmers' High School of Pennsylvania, now the Pennsylvania State College, is not dissimilar. Contributions of 200 acres of land and $25,000, of which $10,000 was pledged by the State Agricultural Society and $10,000 by General James Irvin, and $5,000 bequeathed under the will of Mr. Elliott Cresson, were obtained and a like sum then granted by the state legislature. Subsequently other gifts were made as the condition to additional state aid.

With the passage of the Morrill Act the Federal Government became the chief sponsor of collegiate education in agriculture. The location of the colleges provided for led to much competition among communities, as a result of which many private contributions, mainly in the form of sites and funds for buildings, were made.

Meanwhile the need for experimental work in agriculture had begun to be realized, and in addition to what could be undertaken in a voluntary way by the colleges of agriculture, efforts were put forth to establish research organizations. In Connecticut in particular, following the earnest advocacy in 1873 of Professors Atwater and Johnson, attempts were made for several years to secure an appropriation from the State for the establishment of an experiment station. The project made many warm and enthusiastic friends but, as might have been expected, the great mass of the farmers took little interest in the enterprise. When it had become apparent that it could not otherwise succeed Mr. Orange Judd, then editor and proprietor of the *American Agriculturist*, offered on his own part $1,000 to begin the undertaking and on the part of the trustees of Wesleyan University the free use of its chemical laboratory. These offers were made on condition that the legislature should appropriate $2,800 per annum for two years for the maintenance of the station.

Small as were these contributions in amount they proved to be the turning point in the scale. An act making the appropriation proposed was passed unanimously and approved July 2, 1875. The organization at Middletown of the first experiment station in this country speedily followed, and in the period provided for so clearly demonstrated the usefulness of the enterprise that the State assumed responsibility for its operation on a permanent basis at New Haven. Other States soon followed the example set by Connecticut, among them Massachusetts, where a similar gift was made in 1878 by Hon. Levi Stockbridge. To these small beginnings may be traced the comprehensive system of experiment station research of to-day.

The Houghton Farm enterprise deserves mention as the only attempt in America to establish an agricultural experiment station through the munificence of a single individual. In 1876 Mr. Lawson Valentine, of New York City, acquired a tract of several hundred acres in Cornwall, Orange County, N. Y., which he soon afterwards planned to utilize for systematic experimentation in agriculture, on the general model of the work of Lawes and Gilbert at Rothamsted. In 1881 Major Henry E. Alvord was placed in charge, with instructions to organize and operate a scientific department devoted to agricultural investigation and experiment. Houghton Farm was conducted along these lines for about five years, the experimental department being maintained at a total cost of nearly $20,000 per annum. Operations were finally ended by the death of Mr. Valentine in 1888.

To Mr. William R. Lockwood, of Norwalk, Conn., belongs the credit for the first considerable permanent endowment of agricultural research in this country. In a will dated January 9, 1894, half of Mr. Lockwood's estate was devised to the Connecticut State Station "to use and apply all the balance or net income in the promotion of agriculture by scientific investigation and experiment, and by diffusing a knowledge of the practical results thereof among the people of the State of Connecticut in such manner as shall be deemed by the board of control or governing body of said institution for the time being, most practicable and generally useful." This bequest now yields an income of about $10,000 a year.

One of the largest bequests for agricultural education has been that of Mr. Benjamin Thompson, a farmer of Durham, N. H. Mr. Thompson died in 1890, leaving practically his entire estate to the

State of New Hampshire for a state college of agriculture, to be located on his farm. The conditions of the will were accepted by the State March 5, 1891, and in consequence the New Hampshire College of Agriculture and the Mechanic Arts, then located in Hanover as a department of Dartmouth College, was removed to Durham. This necessitated the abandonment of an earlier gift by the Hon. John Conant of 360 acres of land at Hanover, which had been used as a college and station farm. The Thompson bequest became available in 1910, when it amounted to nearly $800,000.

The Storrs Agricultural School, now the Connecticut Agricultural College, owes its establishment and present location largely to the gifts of the Storrs family in 1881, a farm of 170 acres and several buildings being given by Mr. Augustus Storrs for the purpose, and Mr. Charles Storrs contributing $6,000. In 1906 a legacy of the late Edwin Gilbert bequeathed to the college a farm at Georgetown, Conn., of about 356 acres with buildings and equipment, for maintenance by the college for the purpose of teaching agriculture, together with $60,000 for caring for the farm and for instruction.

In the same year the University of California was designated as the beneficiary of a bequest by the late M. Theodore Kearney, of Fresno, of an estate of 5,400 acres, valued at about one million dollars. Considerable litigation resulted, but the case was eventually decided in favor of the university, which came into possession of the property in 1910. This munificent gift is to be used by the college of agriculture and the experiment station for agricultural instruction and research, and affords unusual opportunity for experiments of interest to the San Joaquin Valley.

An estate of about $40,000 was bequeathed by Mr. Philip Weiser, of Lander, Wyo., for an agricultural college at that location. A long period of litigation followed as to the location of the land-grant institution, which was eventually decided in favor of the state university at Laramie.

Numerous donations for the introduction of agriculture into the curriculum of private institutions have been reported. An anonymous gift to Columbia University of $15,000 for agricultural education was announced in 1910, and Mr. William Blodgett has given a farm of 750 acres at Fishkill-on-the-Hudson, which it is planned to develop as an agricultural school. Messrs. George and William W. Mathes in 1901 gave $10,000 to Union Academy, Belleville, N. Y., for this purpose, and through the late Mrs. Phoebe Strawn Illinois College, at Jacksonville, received $20,000 and inaugurated with it a course in secondary agriculture. The establishment of a secondary school of agriculture at Lyndonville, Vt., was effected in 1910 through a gift of Mr. Theodore N. Vail, whose great estate in the vicinity affords the school abundant materials and unusual opportunities for practical work and observation. About 1900 Rev. Francis Goodwin gave the Handicraft Schools of Hartford, Conn., a farm of 75 acres just outside the city for utilization as a school of horticulture. In 1901 a school of practical agriculture was opened at Briarcliff Manor, N. Y., and maintained through contributions of several business men of New York City, notably Mr. R. Fulton Cutting and the late Mr. Abraham S. Hewitt, for two years, when it was closed on account of failure to secure a permanent endowment of $200,000. There have also been numerous other enterprises for the provision of secondary or elementary education in agriculture, several of which are in active operation.

The well-known work of Hampton and Tuskegee institutes needs only to be mentioned as typical of the institutions giving agricultural instruction for a special portion of our population, and receiving their main support from private funds. The Baron de Hirsch Agricultural School at Woodbine, N. J., with maintenance expenses of about $30,000 per annum, is financed mainly by the Baron de Hirsch fund for the amelioration of the condition of Jewish immigrants, but has also received some assistance from the Jewish Colonization Association of Paris. The National Farm School at Doylestown, Pa., is a similar enterprise maintained largely by private funds. It is also of interest to note the organization in this country of the Jewish Agricultural Experiment Station, which has for its object the establishment and maintenance of an experiment station in Palestine. The collection of over $20,000 for initial equipment and the pledging of at least $10,000 per annum for current expenses is announced.

A number of gifts have been made which are restricted to a particular line of agricultural work. For example, the University of Minnesota and Harvard University have each received gifts of 2,200 acres of forest land for instruction and experimental work, and the Yale Forest School has been the recipient of large sums from the Pinchot and Jessup families and the National Lumber Association. The first chair of agricultural journalism in this country, that at the Iowa State College of Agriculture and Mechanic Arts, has owed its beginnings and a part of its subsequent maintenance to gifts of Mr. John Clay, of Chicago. A somewhat similar bequest is that of Dr. Charles A. Ring to Cornell University, the income of which is to be used in the advancement of horticultural science.

Scholarships of various kinds have been endowed at most of the agricultural colleges. One of the largest donations has been that of the late Dr. C. H. Roberts, of Ulster County, N. Y., who gave $30,000 in 1906 for five scholarships in the College of Agriculture at Cornell

University. A bequest of the late Major Henry E. Alvord to the Massachusetts Agricultural College for a dairy scholarship was made public in 1905. There have also been many bequests for the aid of worthy students in these institutions.

Since 1906, $5,000 per annum has been distributed among the state agricultural colleges in 20 scholarships, which are competed for at the International Live Stock Exposition in accordance with an offer of Mr. J. Ogden Armour. Rosenbaum Brothers of Chicago have also offered $1,000 per annum in prizes to the colleges in connection with the exposition, and other donations have been made from time to time.

A unique form of financial assistance are the industrial research fellowships at the College of Agriculture at Cornell University. Several of these have been offered for short periods by firms of manufacturers of agricultural implements and supplies, small sums being provided for the salaries and expenses of investigators along lines of work of mutual interest. The five fellowships thus far announced have dealt respectively with the value of commercial lime-sulphur mixtures as fungicides, the diseases of nursery stock, the effect of cement dust on the setting of fruit, the diseases of New York apple trees, and the nature and control of fungus diseases and insect pests of orchards in a given locality. The last two of these are supported by local fruit growers' associations.

Along extension lines, important assistance to agriculture is being rendered by the various railway systems, often in the form of direct contributions to the agricultural colleges and experiment stations for cooperative work, notably dry farming and other demonstration farms, the gifts of land for these purposes, the providing free of cost of the rolling stock for the better-farming trains so numerous in recent years, and frequently in the offering of scholarships to boys living along the railway lines. The farmers' cooperative demonstration work which this Department has been conducting in the South has received for several years the cooperation of the General Education Board of New York City, and considerable sums have also been donated by boards of trade and other local organizations.

Two bequests for permanent local demonstration work have recently become available in Massachusetts. One of these is the Faunce bequest, at Sandwich, of a farm of about two hundred and fifty acres and about $20,000 by a local physician, for use in benefiting the people of the county agriculturally. This bequest is being utilized in active cooperation with the Massachusetts Agricultural College, as a part of its extension activities. The second was one of $100,000 to the town of Hardwick, by the late Mr. Calvin Paige, a former resident. The income of this bequest is to be utilized to further the agricultural interests of the community through the demonstration of improved methods.

If wisely planned and administered, it would seem that such bequests could be made very helpful, and the idea might well be considered as an opportunity for benefiting the people of a local community, not unlike those afforded by the village library or the town academy, which have been favorite recipients of bequests in the past.

No comprehensive review of agricultural endowment in foreign countries is attempted, but by way of illustration reference may be made to the princely gifts of Sir William Macdonald in Canada, including Macdonald College, and to the well-known instances of the Lawes Agricultural Trust and what it has accomplished at Rothamsted, the liberal aid to agricultural work at Cambridge University by the Drapers' Company of London, and the bequest of the late Mr. John Innes, whereby $50,000 a year is available for the promotion of horticultural instruction, experiments, and research at the John Innes Horticultural Institution. A sum of nearly three hundred thousand dollars was recently bequeathed by the late Mr. S. B. Thomas for the establishment of an agricultural college in Sierra Leone, Africa. The establishment of the Imperial Agricultural College of India, located at Pusa, is attributed to its initial endowment of $150,000 by an American, Mr. Henry Phipps, of Pittsburgh. What is probably the largest bequest to agriculture yet recorded was recently announced on the death of Dr. S. N. Kolaceoskij, who has left property valued at over twenty million dollars for the establishment of an agricultural academy in southern Russia.

This cursory and incomplete review illustrates the scope and the diversity of private aid to agricultural instruction and experimentation. It has come often from unexpected sources, and it shows the gradual spread of an idea.

All these various forms of gift have been helpful in their way in working out the plan of agricultural instruction, providing for experiments in different forms in periods of doubt, developing special features, aiding needy students, and pointing out means for the improvement of agricultural conditions locally. They call attention to an opportunity for affording aid in both a small and a large way, which will redound to the benefit of the public in a quite direct manner and will give a large measure of return.

The fear that, in the case of established institutions, such gifts will result in a mere substitution of private funds for public appropriations does not appear to be well founded, for such gifts can be made to stimulate public support and to supplement it in a variety of useful ways. The experience of the past offers many illustrations of this, and the present growth of agricultural instruction with its attendant needs multiplies the opportunity for helpful donations.

In the field of experimentation, which furnishes the backbone of instruction and extension efforts, as well as the improvement of farming efficiency, it may be pointed out that the world still lacks a large and permanently endowed institution for research in agriculture, analogous to the Rockefeller Institute in the field of medical research, for example. There is much which can not be done, or done in the way it should be, for the lack of suitable funds.

On a less pretentious scale the aiding of definite lines of inquiry, especially those to which public funds may not be immediately available, would furnish practical means of promoting inquiry in a field or special group of problems in which interest lay, and the endowment of an institution so that it could pursue such inquiries through a considerable period would be the best means of furthering such an end. The present status of agricultural research offers great opportunity for such special fundamental studies before the more simple forms of experiment can hope to make definite progress, as, for example, the functions of animal nutrition, or the physiological conditions and relationships of plant growth, or a further refinement of methods of experimentation; and in another direction the provision for certain classes of technical publications would solve a present perplexity and a great hindrance to progress.

With the recent revival of interest among nonagricultural people in agriculture and country life, and the increasing realization of the fundamental importance of agricultural development to the prosperity of the nation, greater attention to the possibilities afforded by the use of private funds may confidently be expected in the future. The situation may be summarized in the words of Sir George Clarke, in a recent address at the opening of the Poona Agricultural College, in which he says: "If the nature and vast importance of agricultural work were more widely known I am certain that our many wealthy and generous philanthropists would come forward to help. There can be no better proof of patriotism and no better way of promoting prosperity than the increase and development of the production of the land which lies within our power if adequate means were available."

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

[The sampling of fertilizers, soils, foods, water, feeding stuffs, and miscellaneous materials], L. FOURTON (*Estac. Agr. Cent.* [*Mexico*], *Circs. 27, pp. 4; 28, pp. 5; 29, pp. 6; 30, pp. 5; 31, pp. 7; 32, pp. 8*).—A description of the methods of sampling utilized at the Estacion Agricola Central of Mexico.

The interpretation of color values obtained by Lovibond's tintometer, A. W. KNAPP (*Jour. Soc. Chem. Indus., 29* (*1910*), *No. 23, pp. 1343, 1344*).—The author points out that where two or three standard glasses are utilized for determining the color of fluids, solids, etc., no allowance is made for the stoppage of white light. He holds that this should be taken into consideration when recording results.

Methods for the rapid examination of water, A. DANÉ (*Chem. Ztg., 34* (*1910*), *No. 119, pp. 1057, 1058*).—This is a discussion and description of rapid methods for detecting and determining nitrites, nitrates, chlorids, ammonia, magnesium, sulphates, calcium, total carbon dioxid, organic matter, and *Bacillus coli*. Some of these methods are modifications of the standard methods in present use for water analysis.

The determination of free carbon dioxid in water, J. TILLMANS and O. HEUBLEIN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20* (*1910*), *No. 10, pp. 617–631, figs. 2*).—It appears from this work that the free carbon dioxid in water can be accurately estimated with limewater and other alkalis, using phenolphthalein as an indicator, providing certain precautionary measures are taken to prevent the loss of the carbon dioxid. Sulphates, chlorids, nitrates, and bicarbonates of the alkalis and alkali earth metals react neutrally toward this indicator, while rosolic acid is neutral to sulphates, chlorids, and nitrates of the alkalis and alkali earth metals, but reacts strongly alkaline with their carbonates and bicarbonates. According to this, Pettenkofer's qualitative test, which utilizes rosolic acid for detecting free carbon dioxid can not be used with certainty for small amounts of free carbon dioxid nor for large amounts when much bicarbonate is present. The quantitative determination of free carbon dioxid in water by titration with alkali or borax solution, using rosolic acid as indicator, yields inaccurate results.

Dissolved oxygen as an index of pollution, G. A. SOPER and P. B. PARSONS (*Abs. in Science, n. ser., 33* (*1911*), *No. 844, p. 344*).—The determination of the dissolved oxygen has been found to be a good index for determining the pollution of water by sewage. The authors state that they have perfected a field method for this purpose.

The use of calcium carbid for determining moisture, I. MASSON (*Chem. News, 103* (*1911*), *No. 2670, pp. 37, 38*).—The author points out the advantages of using calcium carbid for determining water (E. S. R., 22, p. 513) in various agricultural products as, for instance, wool, cotton, tobacco, flour, wood pulp, paper, etc.

A method for the exact determination of ash in vegetable and animal matter, E. FLEURENT and L. LÉVI (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 11, pp. 715–718*).—The authors found after making a comparative study between the Schloesing and the ash calcination methods with wheat, barley, dried peas, white haricots, egg yolk, horse meat, etc., that these methods furnish very variable results and do not compare well. This is due to three factors, (1) a portion of the phosphorus is acted upon by the carbon and volatilized, (2) another goes off as a volatile compound with the fatty matters, and (3) the acid phosphates of the ash are acted upon by the silica.

They, therefore, propose a method which involves (1) the removal of the fat in substances rich in fat, (2) the carbonizing in a platinum crucible at a very low temperature, (3) pulverizing the mass contained in the crucible or mixing it with milk of lime (0.04 to 0.5 gm. of calcium oxid for 10 gm. of initial substance rich in phosphorus), and (4) evaporation to dryness according to Schloesing's method. According to the authors, the method is easy and does not involve any loss.

In regard to the physiology of catalase and reductase, W. PALLADIN (*Dnevn. XII. S" iezda Russ. Est.-Isp. i Vrach.* [*Moscow*], *1910, p. 17; abs. in Zentbl. Biochem. u. Biophys., 10* (*1910*), *No. 15–16, p. 746*).—By autolyzing zymin and wheat germs upon water a decrease in the catalytic activity takes place. In the presence of Na_2HPO_4 the catalytic power increases markedly, while with KH_2PO_4 it weakens, and K_2HPO_4 completely destroys it. The author considers catalase and reductase anaerobic enzyms, but draws attention to the fact that the true enzym nature of these bodies has not been established.

Analysis of foods, R. GUILLIN (*Analyses Alimentaires. Paris, 1911, pp. 480, figs. 87*).—The work contains methods for the analysis of sugars, starch, flour and pastry, beverages, fats, meats, conserves, coffee, tea, and chocolate, spices, and waters, antiseptics, sweeteners, and laws in regard to food adulteration inspection.

Biological methods for detecting horseflesh in pork products, BLANC (*Ann. Falsif., 3* (*1910*), *No. 26, p. 516*).—The author describes some of the difficulties encountered with the usual biological methods and the manner of procedure.

The biological method for detecting horseflesh in pork products, G. BLANC (*Ann. Falsif., 4* (*1911*), *No. 28, pp. 49–52*).—This method, referred to in the article noted above, is based on the fact that when a rabbit is injected intravenously with horse serum a precipitating reagent is produced. This reagent when brought into contact in vitro with maceration extracts of horseflesh, or products containing horseflesh, produces a precipitate. It is specific for all products coming from horseflesh.

The methods of preparing the precipitating reagent and the technique for making the test are given in detail.

Composition of the ash of pickles, E. H. S. BAILEY (*Abs. in Science, n. ser., 33* (*1911*), *No. 844, p. 345*).—The author has made numerous analyses of the ash of normal pickles for the purpose of judging pickle conserves in regard to the addition of alum for hardening.

The determination of starch sirup in plum marmalades, A. BEYTHIEN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21* (*1911*), *No. 5, pp. 271–280*).—The author points out that it is incorrect when determining the starch sirup content of plum jams and plum marmalades to deduct 21.5 from the specific rotation of the inverted extract and then to utilize the table set up by Juckenack.[a] Furthermore, in examining plum jams which contain no cane sugar it is essential to apply the formula $x=\frac{100}{134.1}\times D$, in which x=the percentage of anhydrous starch sirup in the inverted extract and D the specific rotation of the extract. The author, however, recommends the retention of the Juckenack procedure for plum marmalades.

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[a] Ztschr. Untersuch. Nahr. u. Genussmtl., 8 (1904), p. 32.

Biological study of honey, E. MOREAU (*Ann. Falsif., 4 (1911), No. 28, pp. 65, 66*).—The author determined the catalytic activity, the amylolytic power, and the inverting power of 20 honeys of various kinds. The results of the invertase test are to be reported in detail later. All the honeys contained invertase.

The origin of formic acid in honey, R. REIDENBACH (*Leipzig. Bienen Ztg., 26 (1911), Nos. 2, pp. 21–23; 3, pp. 35–38; 4, pp. 51–55*).—The presence of formic acid in honey is due to the oxidation of the sugar contained in the honey itself. It was also found to be present in the brood combs, but chiefly in combination with ammonia.

Corrosion of metallic food containers, E. GUDEMAN (*Amer. Food Jour., 5 (1910), No. 11, pp. 35, 36*).—This is a general discussion of the subject, in addition to which the author relates his experiments in regard to obtaining a commercially feasible nonporous can with gold or antimony amalgam and enamel. The possibility of utilizing lead glass for making enameled cans is also discussed.

Detecting adulteration in feeds with the so-called anaphylaxis reaction, K. SCHERN (*Deut. Landw. Presse, 37 (1910), No. 87, p. 945*).—The author shows the possibilities of this reaction for detecting castor oil seeds (Ricinus), etc., in feeds.

German and Russian official methods for raw sugar analysis, W. E. GROSS (*La. Planter, 46 (1911), No. 6, p. 85*).—A description of the methods for water, ash, invert sugar, and sucrose.

In regard to Jolles' method for the quantitative estimation of saccharose among other sugars, BRUCKNER and WELWART (*Österr. Chem. Ztg., 14 (1911), No. 3, pp. 29, 30*).—The authors conclude that Jolles's method (E. S. R., 24, p. 704), when compared with other methods, can not be regarded as quantitative.

In regard to my method for determining saccharose quantitatively among other sugars, A. JOLLES (*Österr. Chem. Ztg., 14 (1911), No. 3, pp. 30–32*).—A reply to the above, accompanied by results of cooperative work with several chemists for the purpose of showing the value of the method as a quantitative test.

Hygromipisimetry; a method for examining milk, R. BINAGHI (*Rev. Gén. Lait, 8 (1910), No. 16, pp. 361–371, fig. 1*).—The author describes a physical method, which he terms "hygromipisimetry," for detecting adulterated milk. Some results for sheep's, goat's, and cow's milk are given.

Milk, F. V. DARBISHIRE and W. GOODWIN (*Jour. Southeast. Agr. Col. Wye, 1909, No. 18, pp. 215–219*).—A discussion in regard to milk containing added water or abstracted fat, and the use of formulas for detecting these.

The chemical and biological differentiation of the three proteins in cow's and woman's milk, J. BAUER and S. ENGEL (*Biochem. Ztschr., 31 (1911), No. 1–2, pp. 46–64*).—It was determined in this work that the 3 milk proteins (casein, albumin, and globulin) of cow's and woman's milk could be biologically differentiated, and that globulin is more closely related to casein than to albumin. On the other hand, albumin seemed more closely related to globulin than to casein. It was also noted that despite the biological relations of casein with the other milk proteins, the biological methods can not serve as an absolute control of the chemical methods for the precipitation of casein. Colostrum and blood-serum proteins behave in the same manner as those of milk and whey. The albumin and globulin of serum, milk, and colostrum, according to the authors, are probably identical.

In regard to the refractometry of calcium chlorid milk serum, G. Fendler (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 10, pp. 640, 641*).—The author points out that the literature in regard to Zeiss's immersion refractometer does not draw attention to the fact that a correction must be applied to the refractive indexes as read off with the instrument. He, therefore, corrects some of his findings in the work with the calcium chlorid milk serum which has already been reported (E. S. R., 24, p. 612).

The value of the various chemical and physical methods for the detection of adulteration in milk and butter, C. Granvigne and G. Cassez (*Ann. Falsif., 4 (1911), No. 28, pp. 77-85*).—This is a discussion and study in regard to the value of different methods for detecting adulterations of milk, such as watering and the removal of cream, and the determination of fat-free dry substance, lactose, and the composition of butter.

Tests and observations in regard to the separation of water from butter, O. Hoffmeister (*Molk. Ztg. [Hildesheim], 25 (1911), No. 16, pp. 271, 272*).—The author sought to determine the cause for the separation of water from butter samples, but found no definite relationship existing between the separation of water and the consistency and water content of the butter. In attempting to determine the degree of water separation, he found that the amount of water was different in the various areas of the same sample, and that the samples of butter containing the highest amounts of water had the superficial appearance of being the driest.

In regard to the causes for the separation of water the author believes that these may be looked for in the various methods utilized for the manufacture of butter, and possibly in the variation in chemical composition and the mechanical structure of the fat. The analytical results for moisture obtained with Funke's apparatus and the Hesse-Röse-Gottlieb method showed that the former gave the higher results.

A new method for determining volatile fatty acids, E. Welde (*Biochem. Ztschr., 28 (1910), No. 5-6, pp. 504-522; abs. in Zentbl. Biochem. u. Biophys., 11 (1910), No. 1, p. 3*).—The author modified the old method for volatile fatty acids in so far that the acids are distilled off in a vacuum with steam.

The use of glycerin in saponifying fats in the titer test, R. H. Kerr (*Jour. Indus. and Engin. Chem., 3 (1911), No. 2, pp. 114, 115*).—The method, which is a rapid one, is as follows:

"Fifty cc. of high-grade chemically pure glycerin (97 per cent glycerin) and 20 cc. concentrated caustic potash solution (100 gm. KOH dissolved in 100 cc. distilled water) are placed in a liter flask and warmed gently on an asbestos board over a low flame. When hot, 50 gm. of the molten fat are poured in and the flask rotated gently. Saponification begins at once and is soon complete, although there is usually some foaming before the mixture becomes clear. Complete saponification is shown by the mixture becoming perfectly clear and homogeneous. When saponification is complete the flame is removed and 500 cc. of hot water added, cautiously at first, to avoid excessive foaming. The flame is then replaced and sufficient dilute (1:3) sulphuric acid added to decompose the soap. A few minutes' boiling gives a clear layer of fatty acids. The acids are then washed and dried in the usual way. The process is quite rapid, clear acids being obtained in 20 to 25 minutes. The results show perfect agreement with standard methods."

Rapid saponification of fats for titer determination, C. V. ZOUL (*Jour. Indus. and Engin. Chem., 2 (1910), No. 11, pp. 479, 480*).—Practically the same method as described above.

Saponification of fats for titer determination, A. CAMPBELL and C. P. LONG (*Jour. Indus. and Engin. Chem., 3 (1911), No. 2, p. 114*).—A polemic in regard to the question of priority for the Zoul method.

The absorption spectra of oils, R. MARCILLE (*Ann. Falsif., 3 (1910), No. 24, pp. 423–425*).—Some observations in regard to the absorption spectra of olive, peanut, sesame, cottonseed, linseed, and castor oils, with particular reference to the absorption spectra due to the presence of chlorophyll in these oils.

On the interpolation method of oil analysis, J. J KESSLER and G. K. MATHIASON (*Jour. Indus. and Engin. Chem., 3 (1911), No. 2, pp. 66–72, figs. 10*).—This work was done with castor, cottonseed, and linseed oils and a resin and mineral oil. According to the authors, "certain tests commonly used in oil analysis (the viscosity, flash test, fire test, and Maumené test) have been shown to follow a law of mixtures which is not an additive one, and hence if interpolations are made from the data obtained from such tests the results will be in error to a very considerable amount in some cases.

"These results call attention to the possibility of many other physical tests being nonadditive. They also suggest the possibility that certain chemical tests, in which a complete chemical reaction does not occur, may not be additive. The saponification number is shown to be an additive relationship even for small percentages of one oil in presence of another. The Maumené test as carried out at the present time is incapable of yielding results which can be used in making a quantitative analysis by the interpolation method."

The dimethyl sulphate test of creosote oils and creosote dips; a substitute for the sulphonation test, R. M. CHAPIN (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 167, pp. 7*).—Although the sulphonation test for examining coal-tar creosote sheep dips in theory is simple and rational, its use by inexperienced persons is often unsatisfactory and is always disagreeable and tedious. In view of these facts, the author has adopted the Valenta test[a] for the examination of such preparations. This test is based on the assumption that dimethyl sulphate is miscible in all proportions with the closed-chain hydrocarbons, while the open-chain hydrocarbons are not soluble in it at all. Some comparative results between the Valenta test and the sulphonation test are given.

Lime-sulphur spray, J. E. HARRIS (*Michigan Sta. Tech. Bul. 6, pp. 3–9*).—Recognizing the need of improvements in the way of accuracy and rapidity for the analytical methods usually employed in the analysis of lime-sulphur spray, the author, as a preliminary to work reported elsewhere, investigated the existing methods for total sulphur, monosulphid sulphur, thiosulphate sulphur, sulphite and sulphate sulphur, and calcium oxid. The work is summarized as follows:

"The total sulphur is determined by oxidizing the sulphur present to the sulphate form, using sodium peroxid as the oxidizing agent and precipitating and weighing as barium sulphate.

"The monosulphid sulphur is determined by titrating a 25 cc. sample of the diluted solution with decinormal iodin until the yellow color disappears. The number of grams per 100 cc. of the original solution is given by the computation $\frac{\text{Cc. iodin} \times 0.0016 \times 1000}{25}$.

"The thiosulphate sulphur is determined by continuing to add iodin solution after the monosulphid end point has been reached until we have one drop in excess. This additional amount of iodin determines the amount of thiosulphate sulphur. For a 25 cc. sample the grams per 100 cc. of original solution is given by the computation $\frac{\text{Cc. iodin} \times 0.0064 \times 1000}{25}$.

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[a] Chem. Ztg., 30 (1906), No. 25, pp. 266, 267.

"Sulphate and sulphite sulphur are determined together by precipitation in the cold as barium sulphate after filtering off the sulphur from the solution used for the monosulphid and thiosulphate sulphur determinations.

"Total sulphid sulphur may be determined by dissolving the sulphur precipitate, filtered off for the sulphate sulphur determination, in concentrated potassium hydroxid, oxidizing and precipitating as barium sulphate.

"The calcium oxid may be determined by oxidizing the sulphur to the sulphate form and precipitating the calcium as the oxalate. It may also be determined by computation from the amount of iodin used in the monosulphid and thiosulphate sulphur determinations and from the amount of sulphate and sulphite sulphur present. The following computation gives the number of grams per 100 cc.: (Cc. iodin used for monosulphid sulphur) + (2 × Cc. iodin used for thiosulphate sulphur) $\times \frac{0.0028 \times 1000}{25}$ + (sulphate and sulphite sulphur) × 1.75."

In regard to the advantages of these methods over old methods, it is noted that the use of sodium peroxid as an oxidizing agent is more convenient than either hydrogen peroxid or bromin water. Furthermore, substituting iodin titration for ammoniacal zinc chlorid solution does away with the filtering off of test portions for determining the end point by an external indicator. The dissolving of the zinc polysulphid sulphur or sulphur precipitate and the treatment of the solution with acid as a preliminary to making the thiosulphate sulphur determination are eliminated, and a "method of determining the calcium oxid present by computation from the decinormal iodin used for the thiosulphate and monosulphid sulphur determinations and from the sulphate and sulphite present" is introduced

About a sensitive glue reaction, E. SCHMIDT (*Chem. Ztg., 34 (1910), No. 94, p. 839; abs. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 17-18, p. 779*).—If to a glue solution there is added, in the cold, an aqueous solution of ammonium molybdate (3 gm. to 250 cc. of water) and a few drops of dilute nitric acid, a white precipitate is produced which settles very quickly and after a short time assumes a blue-green color. The supernatant liquid also assumes this color. The precipitate dissolves on heating and only a slight turbidity remains.

Report of the activities of the agricultural experiment station at Hildesheim, AUMANN (*Ber. Landw. Vers. Stat. Hildesheim, 1910, pp. 14*).—This is a report on the activities of the station from November 1, 1909, to October 31, 1910, and deals with results of analyses of artificial fertilizers (8,011 samples, of which 3,862 were Thomas slag powder); commercial feeding stuffs (8,097 samples); soils (179 samples); various commodities of the sugar industry and other technical substances and foodstuffs (2,445 samples, of which 1,184 samples were waters); and 220 samples of seeds.

Drying machinery and practice, T. G. MARLOW (*New York and London, 1910, pp. XX+326, pls. 17, figs. 174*).—This is a handbook on the theory and practice of desiccating and drying, and contains a classified description of the installations, machinery, and other apparatus. The topics treated in the work which are of interest to agrotechny are the desiccation of albumin, ashes, asphalt, barley, beet and cane sugar, blood, bone meal, bran, brewery grains, cement, cocoa, distillery draff, excretions, feathers, fiber, farina, flax, flour, fruits, grain, hops, oats, leather, marl, manure, meat, molasses, phosphates, rice, rubber, spirits, superphosphates, and wood.

The drying of beets, Fabre (*Sucr. Indig. et Colon., 76 (1910), No. 10, pp. 224–227; abs. in Chem. Ztg., 34 (1910), No. 120, Repert., p. 496*).—The author advises pressing out the beets twice and then drying the mass with exhaust steam. By mixing the residue with finely cut straw a stable, easily transportable foodstuff containing 20 to 25 per cent of sugar can be obtained.

Molasses feeds, R. Vallier (*Rev. Gén. Chim., 13 (1910), No. 23, pp. 367–370; 14 (1911), No. 1, pp. 9–14, figs. 5*).—This is a general discussion on molasses feeds and the methods of manufacture. A complete description of the machinery required is given.

In regard to the preparation of adenin in molasses waste, K. Andrlík (*Ztschr. Zuckerindus. Böhmen, 34 (1910), No. 10, pp. 567–569; abs. in Chem. Zentbl., 1910, II, No. 9, p. 640*).—The author found that by boiling molasses waste with copper sulphate and alkali about 0.05 per cent of adenin separated out. Part of it could be obtained in crystalline form by decomposing the copper precipitate with hydrogen sulphid in a concentrated solution. A further 0.03 per cent could be obtained from the mother liquor by precipitation with picric acid.

Yearbook of sugar manufacture, J. Bock (*Jahresber. Zuckerfabrik. [Stammer], 49 (1909), pp. XII+361, figs. 25*).—This is a retrospect of practically all the important work done in the sugar-producing industry for the year 1909, including agriculture, the manufacture of sugar, the chemistry of sugar, patents, statistics, and sugar legislation.

The raw materials and methods of the soft-drink industry, H. Goettler (*Pure Products, 6 (1910), Nos. 2, pp. 64–71; 3, pp. 120–127; 4, pp. 178–184; 5, pp. 235–241; 6, pp. 320–323; 7, pp. 373–378; 9, pp. 501–506; 10, pp. 567–576; 11, pp. 635–639; 7 (1911), No. 1, pp. 4–10*).—This is a description of the methods used for the production of various nonalcoholic drinks.

On apple aroma, E. Walter (*Pure Products, 6 (1910), No. 12, pp. 696–700*).—The rational manufacture of apple extract from the fresh or dried apple peels is discussed.

Alcohol from the carob bean, H. H. Morgan (*Jour. Indus. and Engin. Chem., 3 (1911), No. 2, p. 139*).—The tree upon which this bean grows is a leguminous evergreen and a habitat of Spain, Italy, and the Levant. The bean, which has hitherto been used as a food for animals, is from 6 to 8 in. long and about 1 in. wide.

"Experiments have lately been made in Spain to obtain alcohol from this bean. After triturating the fruit it was immediately placed in hot water to steep and the sugar or glucose extracted by means of a current of water. The liquid resulting from the process was then allowed to ferment, the glucose thus being transformed to alcohol, which was later distilled. It was found that 2.3 qt. of pure alcohol could be obtained from 22 lbs. of the beans."

A factory has been erected at Faro, in Portugal, to manufacture alcohol from these beans.

[A new plant wax], Olsson-Seffer (*Bul. Imp. Inst. [So. Kensington], 7 (1909), No. 4, pp. 410, 411; abs. in Oil, Paint and Drug Reporter, 78 (1910), No. 12, p. 28H; Chem. Ztg., 34 (1910), No. 138, Repert., p. 567*).—A new wax is described, which is obtained from the fruit of *Myrica jalapensis*. It is used by Indians and sold in Mexico for candy manufacturing purposes. The chemical and physical constants are reported.

[In regard to candelilla wax], Olsson-Seffer (*Bul. Imp. Inst. [So. Kensington], 7 (1909), No. 4, pp. 410, 411; abs. in Oil, Paint and Drug Reporter, 78 (1910), No. 12, p. 28H; Chem. Ztg., 34 (1910), No. 138, Repert., p. 567*).—A discussion in regard to the uses, and the physical and chemical constants of candelilla wax (E. S. R., 23, p. 615; 24, p. 516).

Candelilla wax (*Jour. Indus. and Engin. Chem., 3 (1911), No. 2, p. 115*).—A polemical article in regard to the chemistry of candelilla wax (see above).

The chemistry of and the progress in tanning technology, R. KOHNSTEIN (*Österr. Chem. Ztg., 14 (1911), Nos. 5, pp. 54–59; 6, pp. 70–73*).—This is a detailed description of the progress made in the tanning and tawing processes during the last few years.

METEOROLOGY—WATER.

Report of the Chief of the Weather Bureau, 1909–10 (*U. S. Dept. Agr., Weather Bur. Rpt. 1909–10, pp. 281*).—This contains an administrative report reviewing the work of the Weather Bureau during the fiscal year ended June 30, 1910, at Mount Weather research observatory, on forecasts and warnings, and of the river and flood, instrument, climatological, and marine divisions, and tables giving a general summary of the weather conditions in the United States by months during the year 1909, list of observing stations and changes therein during 1909, sunshine in 1909, details of excessive precipitation in 1909, monthly and annual meteorological summaries in 1909, monthly and annual means and extremes of temperature with dates of first and last killing frosts in 1909, monthly and annual amounts of precipitation in 1909, and monthly and seasonal snowfall in 1909 10.

The work at Mount Weather included aerial research and investigations on atmospheric electricity, solar radiation, and vapor in the atmosphere. The upper air observations at Mount Weather were found to be an aid in increasing the accuracy and range of forecasts. Forecasts of certain well defined weather types for 10 days in advance were issued from time to time during the year.

Cooperation between the Weather Bureau and the Forest Service in a study of forest effects on climate and stream flow in the Rio Grande National Forest in southwestern Colorado is referred to. "Two watersheds of similar topography and of limited drainage areas have been selected, and the necessary weirs and instruments for the measurement of stream flow will be located at an approximate altitude of 9,500 ft. above mean sea level, the drainage area extending upward to an elevation of about 10,500 ft.

"It is proposed to measure the flow of the two streams for a sufficient period, probably 8 or 10 years, to demonstrate their behavior with equal forest cover. One of the watersheds will then be denuded and stream-flow measurements continued on both for another period of 8 or 10 years, by which time it is probable that the effects of the denudation, whatever they may be, can be stated in positive terms. In order that all the climatic factors that affect or modify stream flow may be considered, a complete equipment of meteorological instruments will be provided and observations will be taken several times daily. Automatic instruments will afford continuous and permanent records of pressure, temperature, wind direction and velocity, sunshine, precipitation, and evaporation."

Experiments with various methods of measuring snowfall indicated that "snow bins, or cubical boxes, 5 ft. on a side, standing on a frame so that the top is 10 ft. above the ground . . . fitted with a system of louvers on the inside to prevent the wind from blowing out the snow and to insure a level deposit within, catch very nearly the actual amount of fall."

Observations on evaporation from Salton Sea indicate that the evaporation from the surface of the sea is about 70 in. a year. "It has been found by special experiments that the 'Salton Sea' ceases to exercise any influence upon evaporation during the summer at a distance of about 1,000 ft. from the shore.

This would indicate that there is no effect of the sea by way of changing the climate of the country about its neighborhood."

In cooperation with the Reclamation Service the observations on evaporation were extended to about 25 stations in the United States.

Monthly Weather Review (*Mo. Weather Rev., 39 (1911), Nos. 1, pp. 1-156, figs. 3, charts 10; 2, pp. 157-316, figs. 10, charts 10; 3, pp. 317-486, figs. 8, charts 10*).—In addition to the usual climatological summaries, weather forecasts and warnings for January, February, and March, 1911, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 1.—The Pelahatchie Meteor, Which Passed Over Central Mississippi in the Forenoon of October 17, 1910 (illus.), by F. Montgomery; Orchard Heating in Indiana, by W. M. Walton, jr. (see p. 446); Deforestation and Rainfall, by G. V. Sager; The Cold Wave and the Citrus Industry, by B. Bunnemeyer; Colorado River Siphon Tunnel, and Completion of the Roosevelt Dam, Salt River Valley, Ariz., by L. N. Jesunofsky; The Minidoka Irrigation Project, by F. S. Weymouth; and The Drought of 1910 in the Principal Spring-wheat Growing States (illus.), by P. C. Day (see p. 420).

No. 2.—Correction of paper on Are the Springs Colder Now? by G. Reeder, in December, 1910, issue (illus.); Brazos River Overflows and Levee Protection, by W. W. Dibrell; Break in the Lower Colorado, by L. N. Jesunofsky; Notes on the Rivers of the Sacramento and San Joaquin Watersheds during February, 1911, by N. R. Taylor; Note upon the Weather at Redlands, Cal., by W. S. Devol; Work of the Weather Bureau in Protecting Fruit, Especially Frost Protection, by A. G. McAdie; Straw as Protection Against Frost (illus.), by A. G. McAdie (see p. 420); Irrigation in Idaho, by S. H. Hays; and The Normal Temperature of Porto Rico, West Indies (illus.), by O. L. Fassig (see p. 419).

No. 3.—The Average Stream Flow of the Savannah River, by E. D. Emigh; A Pall of Darkness, at Louisville, Ky., and Surrounding Districts (illus.), by F. J. Walz; [Change of Climate in Michigan and Kansas], by J. W. Smith; Investigation of the Water Resources of Minnesota, by R. Follansbee; Origin and Progress of Land Drainage in Bolivar County, Miss., by W. W. Boone; The Roosevelt Dam and the Salt River Project, in Arizona (illus.), by L. N. Jesunofsky; Notes on the Rivers of the Sacramento and San Joaquin Watersheds during March, 1911, by N. R. Taylor; Forecasting the Supply of Water for the Summer from the Depth of Snow (illus.), by A. G. McAdie (see p. 421); Indian Summer, by J. Morrow; and The Lowest Barometric Minima at Sea Level, by W. Krebs, trans. by C. Abbe, jr.

Meteorological observations (*Maine Sta. Bul. 186, pp. 393-395*).—Observations at Orono, Me., on temperature, precipitation, cloudiness, and wind during 1910 are compared with the means of similar observations for 42 years. The mean temperature for 1910 was 44.62° F., the mean for 42 years 42.37°; the precipitation for 1910, 31.68 in., for 42 years 43.41 in.; the snowfall for 1910, 52.25 in., for 42 years 90.8 in.; the number of rainy days in 1910 was 124, cloudy days 163; total movement of wind in miles, 59,812. A table is also given which shows the monthly and annual precipitation during 1910 at 18 different places in Maine.

Weather observations, M. A. BLAKE and A. J. FARLEY (*New Jersey Stas. Rpt. 1909, pp. 99-112*).—This is a record of observations on evaporation, rainfall, and temperature of the air and soil at the college farm at New Brunswick during 1909.

"The total precipitation for the year was 45.51 in., a departure of 1.93 in. below the normal. The rainfall was somewhat unevenly distributed and caused some injury to crops. . . . The first killing frost in the vicinity of New Brunswick occurred October 14 with a minimum of 27°. The coldest day of the year was January 19 with a minimum of —1°. The highest maximum occurred upon August 9 with a temperature of 97° . . . From May 24 to October 30 there was a loss of 3.29 in. of moisture in excess of the rainfall."

The observations on temperature showed that—

"The mean temperature of the air is lower for each month in the year than the mean temperature of the soil 3 in below the surface. . . .

"The mean temperature of the soil 6 in. below the surface is lower for each month in the year than the mean temperature 3 in. below the surface.

"The mean temperature of the soil 9 in. below the surface is higher than the mean temperature 6 in. below the surface for the months of January, February, March, August, September, October, November, and December, but for the months of April, May, June, and July it is slightly lower.

"The mean temperature of the soil 12 in. below the surface is slightly higher than the mean temperature 9 in. below the surface for the months of January, February, October, November, and December. The month of November in the tabulations is an exception, but is not in most years. From March to October, inclusive, the temperature at 12 in. is lower than at 9 in.

"The mean temperature of the soil 18 in. below the surface is slightly higher than the mean temperature 12 in. below the surface for the months of January, February, October, November, and December. From March to October, inclusive, it is lower.

"The mean temperature of the soil 24 in. below the surface is lower than at 18 in. below the surface for each month in the year except November, December, January, and February, when it is slightly higher.

"During the months of December and January the temperature of the soil slightly increases from the 6-in. depth to the 24-in. depth; but during the months of April, May, June, and July it gradually decreases.

"An average of the monthly means for a period of years shows February to be the coldest month and July to be the warmest. There are exceptional years when January has a lower monthly mean than February; also, but much less frequently, there is an exceptional year when the monthly mean for August will be slightly higher than that of July."

The range of the minimum air temperatures for February, 1899, was from —11 to 35° and the range of the maximum air temperatures was from 4 to 53°. The range of the soil temperatures for this month and year was as follows: At 3 in. below the surface from 24 to 35°, at 6 in. 24 to 33°, at 9 in. 27 to 33°, at 12 in. 29 to 33°, at 18 in. 32 to 33°, and at 24 in. 33 to 34°. With an air minimum of —11° on the tenth and eleventh of the month the lowest soil temperature for the month 3 to 6 in. below the surface was 24°.

The maximum range of the daily air temperatures for July, 1901, was from 67 to 105°. The minimum range of the daily air temperatures was from 55 to 74°. The monthly range of the daily soil temperatures was as follows: At 3 in. below the surface, 68 to 93°, a range of 25°; at 6 in., 68 to 91°, a range of 23°; at 9 in., 70 to 89°, a range of 19°; at 12 in., 71 to 86°, a range of 15°; at 18 in., 70 to 81°, a range of 11°; and at 24 in., 70 to 77°, a range of 7°.

The normal temperature of Porto Rico, West Indies, O. L. Fassig (*Mo. Weather Rev., 39 (1911), No. 2, pp. 299–302, figs. 5*).—This article summarizes observations at 43 stations in the island, covering a period of over 11 years.

These observations show that "the mean annual temperature for the island of Porto Rico as a whole is 76.3°, a comfortable and healthful temperature when accompanied, as it usually is in Porto Rico, by the fresh winds of the northeast trades, and a relatively high percentage of overcast skies. The stations on the coastal plain have a somewhat higher mean temperature, about 78° along the north, west, and south coasts, and about 79° along the east coast. At inland stations the mean temperature is below 76°, varying from 76 to 72°, according to elevation above sea level and other local conditions. The lowest temperatures are found, as usual, at the higher elevations, at stations from 2,000 to 2,500 ft. above sea level on the main divide, a range of mountains crossing Porto Rico from east to west a little south of the center of the island.

"The average annual temperature of the island has varied but little from the normal during the past 12 years. In 1901, the warmest year of the period, the average was 1.3° above the normal, and in 1907, the coolest year, 0.9° below. The average temperature was above normal for the island as a whole from 1900 to 1903, inclusive, and normal or below from 1904 to 1910, inclusive. During the year 1910 the temperature continued below normal from January to November, inclusive."

January is as a rule the coldest month, with a general average of 73°; August the warmest, with an average of 79°. During the winter months the mean daily temperature varies from 75 to 76° along the immediate coast, decreasing to 74° over most of the coastal plain and ranging from 72 to 68° at inland stations, depending upon the elevation. During summer and early fall the mean temperature along the coast is 80 to 81°, rising frequently to 82 to 83° along the east coast. At inland stations the mean summer temperature varies from 74 to 76°. There is a fairly constant difference of 6 to 8° between coastal and inland stations throughout the year.

There is a comparatively large diurnal variation in temperature. "At stations on the immediate coast, like San Juan, or on the smaller islands, like Culebra and Vieques, the diurnal range is influenced by surrounding ocean temperatures and is quite small, from 10 to 11°. At all inland stations, and practically all the towns of Porto Rico are 2 or more miles from the coast, the mean daily range is from 20 to 25°, according to local topography."

Meteorology (*New Zeal. Off. Yearbook 1910, pp. 403–410*).—Tables summarize the results of observations on temperature, rainfall, atmospheric pressure, and wind at 16 stations throughout New Zealand during the year 1909, as well as compare the shade temperature for each month in New Zealand with that of other British states and colonies.

Straw as protection against frost, A. G. McAdie (*Mo. Weather Rev., 39 (1911), No. 2, pp. 276–278, figs. 3*).—The action of straw in preventing the formation of frost near the surface of the ground is explained, and the need of investigation on this subject is pointed out.

The drought of 1910 in the principal spring-wheat growing States, P. C. Day (*Mo. Weather Rev., 39 (1911), No. 1, pp. 142, 143, figs. 2*).—This article describes the drought of 1910, which was particularly severe during the crop season in the great spring-wheat region of North Dakota, Minnesota, Wisconsin, Iowa, Nebraska, South Dakota, Montana, and adjoining portions of the Canadian northwest.

It is stated that "over much of this region the precipitation did not equal 50 per cent of the usual annual fall, and the deficiency during the period of spring-wheat growth was even greater in proportion." An examination, however, of charts prepared from the available rainfall data "shows that the area of greatest deficiency in precipitation does not coincide identically with the area of greatest loss to crops. In central and eastern Minnesota, where the rainfall deficiency was greatest, a good crop of wheat was grown and other crops made fair returns, whereas in North Dakota, while the deficiency in precipitation on the whole was not nearly so great, crops were to a large extent nearly total failures. This was due in some measure to the fact that there is normally considerably more rainfall in the eastern portion of the district than in the western, so that while the deficiency was greater, the actual rainfall was still sufficient for fair crop growth."

It is thought that the prime cause of severe crop failure in some cases was the intense heat which prevailed, particularly in the northern and western portions of the district. "Experienced farmers have stated that had normal temperatures been experienced during this critical period fair crops would have been harvested despite the deficient rainfall. Over the more eastern and southern portions of the district high temperatures were less persistent and the damage to crops was not so great."

Forecasting the supply of water for the summer from the depth of snow, A. G. McAdie (*Mo. Weather Rev., 39 (1911), No. 3, pp. 445–447, figs. 2*).—This article briefly discusses this subject on the basis of observations at Summit, Placer Co., Cal., at an elevation of 7,017 ft., and describes a simple mechanical device for comparing total precipitation, snowfall, run-off, and rate of melting of snow with a view to predicting the rate of disappearance of the snow in the mountains and the probable water supply. The data upon which the discussion is based are given in detail.

Surface water supply of the Ohio River basin, 1909, A. H. Horton, M. R. Hall, and R. H. Bolster (*U. S. Geol. Survey, Water-Supply Paper No. 263, pp. 192, pls. 6*).—This is one of the series of papers on the surface water supply of the United States, and gives the results of flow measurements on the Ohio River and its tributaries, covering a drainage area of about 210,000 square miles.

Surface water supply of the Hudson Bay and Upper Mississippi River basins, 1909, R. Follansbee, A. H. Horton, and R. H. Bolster (*U. S. Geol. Survey, Water-Supply Paper No. 265, pp. 231, pls. 4*).—This is one of the series of papers on the surface water supply of the United States, and gives results of flow measurements of streams in the drainage areas tributary to Hudson Bay and the Upper Mississippi River.

Preliminary report on the ground waters of Estancia Valley, New Mexico, O. E. Meinzer (*U. S. Geol. Survey, Water-Supply Paper No. 260, pp. 33*).—This is a preliminary report upon the underground waters of this valley, which covers an area of about 2,000 square miles near the geographic center of New Mexico.

It is stated that "the underground supply is too small to irrigate more than a small part of the valley, but it is sufficient to add materially to the prosperity and comfort of the people. Even where the depth to water is great, the irrigation of a garden, lawn, and orchard will generally be feasible. In the central area, however, the presence of alkali may seriously impair the quality of the water or may prohibit its use. Taken as a whole, the water of Esfancia Valley is a valuable resource that should be developed, but its development should be conducted carefully and with full cognizance of the inherent limitations."

"In spite of the high cost of fuel, if the water is lifted in the most economical way and is wisely used, pumping for irrigation can under favorable conditions be made profitable."

Geology and underground waters of southern Minnesota, C. W. Hall, O. E. Meinzer, and M. L. Fuller (*U. S. Geol. Survey, Water-Supply Paper No. 256, pp. 406, pls. 18, figs. 9*).—The purpose of the investigations here reported was "to determine to the fullest practicable extent the principal facts in regard to the underground waters—their quantity, head, mineral quality, sanitary conditions, and their depths beneath the surface—as well as the best methods of drilling to them and finishing wells for their utilization and to consider all other questions relating to their recovery for human use."

The region investigated included approximately the southern two-fifths of the State of Minnesota, covering an area of 28,265 square miles. In nearly all cases a careful examination was made of the sanitary quality of the waters. The work was done in cooperation with the University of Minnesota.

The bacteriology of water: Its present position, P. F. FRANKLAND (*Jour. Soc. Chem. Indus., 30 (1911), No. 6, pp. 319–334*).—This article discusses the development of the present methods of bacteriological examination of water and explains their importance in supplementing chemical analysis.

The author concludes that "in those cases in which the source and general characters of a water supply are well known, the variations in purity from day to day or from week to week can undoubtedly be more satisfactorily watched by means of bacteriological examination. On the other hand, it is often desired by means of a single examination to ascertain the fitness or otherwise of a water for domestic use, and in such cases the omission of a chemical analysis may lead to an entirely erroneous opinion being formed. The ingredients detected by chemical analysis—organic matter, ammonia, nitrates, chlorids, etc.—on which an opinion as to hygienic quality is based, are all much more permanent and uniform features in the composition of the water than are the amount and the nature of the bacterial life which it may contain. The chemical analysis will, therefore, if skilfully interpreted, enable a much better idea of the potentiality of the water to be obtained than would be possible from a single bacteriological examination."

SOILS—FERTILIZERS.

Agricultural chemistry and vegetable physiology, A. D. HALL (*Ann. Rpts. Prog. Chem. [London], 7 (1910), pp. 208–224*).—This is a brief review of progress in investigations during 1910 on soils, soil bacteriology, chemistry of the growing plant, manures and manuring, and the chemistry of animal nutrition.

It is stated that during this year no outstanding paper comparable to Russell and Hutchinson's work, which appeared in 1909, was published, but that activity was "well maintained in all departments of the subject, and particularly in connection with vegetable physiology several valuable and suggestive investigations have been reported. No additions have been made during the year, to our knowledge, of the action of protozoa in the soil, although several independent investigators have arrived at results which fit in with the theory outlined by Russell and Hutchinson, and in a general discussion on the subject which took place at the Sheffield meeting of the British Association some promising applications to practice were reported in connection with the treatment of greenhouse soils which, although rich in manure, rapidly become unsuited for vegetation, and again in connection with the treatment of the soil of sewage farms."

Special attention is called to Cameron's paper (E. S. R., 23, p. 714) giving a general survey of the Bureau of Soils theory of soil productiveness and fertilizer action; the work of A. Koch on the effect of sugar and other carbohydrates on nitrogen fixation by Azotobacter; and the work of Ulpiani and others on the changes which take place when cyanamid is added to the soil.

Colloid studies in scientific soil investigations, E. RAMANN (*Kolloidchem. Beihefte, 2 (1911), No. 8–9, pp. 285–303, figs. 5*).—This is a review of the present knowledge of the subject. The author is of the opinion that colloid investigations to date have been chiefly concerned with a study of pure adsorptive processes, and that more attention should be given to the study of the more important process, from the standpoint of soil and plant nutrition, of adsorption by exchange, and to changes in the character of colloids due to increase in content of absorbed compounds and protective colloids.

Bacteriological methods for the estimation of soil acidity, J. G. Lipman (*Science, n. ser., 33 (1911), No. 860, pp. 971–973*).—This article notes the lack of a satisfactory method for the quantitative estimation of soil acidity and suggests the use of a method based upon bacteriological reactions. Preliminary experiments are reported which show "that the amount of acid present in cultivated soils may be determined quite accurately by comparing bouillon of varying reactions with equivalent quantities of neutral bouillon containing varying amounts of soil." The proposed method may utilize either ammonifying, nitrogen-fixing, or nitrifying organisms. It is stated that a full report on this subject is being prepared.

Experiments on ammonia and nitrate formation in soils, J. G. Lipman, P. E. Brown, and I. L. Owen (*New Jersey Stas. Rpt. 1909, pp. 117–180*).—Comparisons were made on various soils of the Remy and beaker methods of studying ammonia formation in soils.

The Remy method gave unsatisfactory results. In the beaker method "100 gm. quantities of soil [were] thoroughly mixed with 0.5 gm. of peptone. At the end of 3 or 4 days these portions of soil, kept in covered beakers and maintained at the same moisture content by means of sterile water, were transferred to copper flasks and the ammonia was distilled off and determined."

By neither method was there shown to be any direct relation between the number of bacteria and ammonia formation, but "the methods employed were capable of measuring with a fair degree of accuracy the differences in numbers and nitrate formation." Further experiments indicated a relation between the ammonia formed and the amounts of peptone, dried blood, and cottonseed meal used in cultures.

In a study of various factors affecting ammonia and nitrate formation it was found "that the production of available nitrogen compounds is affected not only by the amount of nitrogenous material present or applied, but also by the depth of soil; that is, the absolute quantity of soil in which a given quantity of nitrogenous fertilizer is distributed."

"In materials like cottonseed meal and dried blood the rate of decomposition is affected up to a certain point by the volume of soil in which they are distributed; that is, by variation in the physical, chemical, and bacteriological factors involved. . . . The results emphasize in a practical way the importance of thorough distribution in the soil. We know that in field practice or under market-garden conditions, even when relatively small amounts of nitrogenous materials are used, the distribution may be so unsatisfactory as to bring a comparatively small amount of soil in contact with a comparatively large amount of fertilizer. Under such conditions the rate of ammonification and of nitrification is likely to be affected in an unsatisfactory manner as indicated by the present experiment."

In continuation of previous experiments (E. S. R., 22, p. 120) showing a certain periodicity in the accumulation of nitrates in soils, experiments were made to show the effect on nitrification of adding varying amounts of nitrate to the soil. The results showed "that the addition of sodium nitrate readily affected the accumulation of nitrate nitrogen in the soil. When 0.2 gm. of $NaNO_3$ were added the accumulation of nitrate was enhanced at the end of 2 weeks as compared with the blank soils. In the following 2 weeks the accumulation of nitrate nitrogen was depressed, showing a deficit of nearly 7 mg. as compared with the corresponding blank soils. After that there was an enhanced accumulation until at the end of 8 weeks the addition of the 0.2 gm. of $NaNO_3$ had resulted in a greater accumulation of nitrate nitrogen equivalent, on the average, to 12.915 gm."

The author concludes that "periodicity in the accumulation of nitrates in the soil may be due to both the temporary prominence of species especially capable of transforming large amounts of nitrate into protein nitrogen as well as to the mere rapid increase of various decay organisms and their intense utilization of nitrates for the building of their bodies."

Investigations on methods of determining the lime requirements of soils, H. R. CHRISTENSEN and O. H. LARSEN (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *29* (*1911*), *No. 12–14*, *pp. 347–380*).—These investigations have already been noted from another source (E. S. R., 24, p. 527).

The color of soils, W. O. ROBINSON and W. J. MCCAUGHEY (*U. S. Dept. Agr., Bur. Soils Bul. 79*, *pp. 29*, *figs. 2*).—This bulletin reports the results of studies on causes of colors and their relation to productiveness in soils, with particular reference to red and yellow soils, and on physical and chemical properties of iron compounds and their solutions.

"Generally speaking, the color of a soil is dependent upon the content of organic matter and ferric oxid, the latter being more or less hydrated. The thicker the film of organic matter and ferric oxid coating the soil grains, the darker the soil. . . . It is probable that the thickness of film surrounding the soil particles is the predominant factor determining color."

Decaying organic matter was found effective in causing a solution of iron in the soil water. The dissolved iron is transported only to a limited extent, owing to the readiness with which it is oxidized to the slightly soluble ferric oxid. It is usually reprecipitated within a short distance, frequently filling crevices from which its parent mineral has been removed

The authors are of the opinion that sufficient difference does not exist between soil temperature of the northern and southern States to cause a change from a hydrated to a dehydrated iron oxid. Mineralogical examinations showed a larger proportion of secondary quartz grains in red than in yellow soils, the secondary grains being characterized by included iron stains and by not possessing the clear gaseous or liquid inclusions which characterize the primary quartz particles. Basic rocks, or rocks rich in ferrous minerals, yield a red soil, and acid rocks, which are relatively low in iron-bearing minerals, yield a yellow soil. Red soils may also result from yellow soils by continued weathering agencies with little erosion, and yellow soils from red soils where erosion agencies and water transport have been active.

The movement of soil material by the wind, with a bibliography of eolian geology, E. E. FREE and S. C. STUNTZ (*U. S. Dept. Agr., Bur. Soils Bul. 68*, *pp. 272*, *pls. 5*, *figs. 2*).—This bulletin brings together, correlates, and summarizes the known data of eolian geology as bearing upon soil formation, translocation, and control. It includes not only a comprehensive review of the literature of the subject but also many of Mr. Free's own observations, made in many cases to clear up obscure points or apparent discrepancies in the work of other investigators. An extended bibliography is given.

The discussion emphasizes the fact that the wind plays an important part in soil genesis, "and is not the least of the great dynamic agents which we now know affect the soil. . . . Wind action, both in removal and transfer, must be regarded as an important item in the newly emphasized dynamic explanations of the soil and its fertility."

"The soil-forming actions of the wind may be classed roughly under two headings, soil removal and soil mixing. In removal the wind is but one of several agents (of which running water is probably the chief) which, by removing weathered soil material from the land surface into the sea, progressively expose the rocks beneath to the processes of decay, enabling the maintenance of that balance upon which depends the permanence of the soil layer. Among these agents the wind is greatest only in areas of considerable aridity, and even there it is by no means the sole active factor. From our present viewpoint, the second or mixing action is of far greater and more general importance. The carrying of soil material from place to place across the land surface makes possible, as already discussed, the existence in any particular soil of minerals not present in its parent rocks, and is one cause of the well-known and remarkable constancy with which the useful minerals occur in the soils of the world. In this action the wind shows its greatest effectiveness. As a mixer of soils already formed, it yields to none. Nor is this action, like the former, confined to arid lands. . . . Even in humid regions there is much movement of soil by wind and soil mixing by such movement is a factor which must not be neglected," a fact well illustrated by one of the author's observations on the wind-blown sands of Anne Arundel County, Md.

Soil erosion, W J McGee (*U. S. Dept. Agr., Bur. Soils Bul. 71, pp. 60, pls. 33, figs. 3*).—This bulletin discusses the agricultural duty of water, the duty of the soil, the natural and abnormal work of water in agriculture, and remedies for soil erosion based on treatment of the soil by tillage, mulching, fertilizing, seasonable plowing, draining, and dust mulching; the treatment of cover by tree planting, grassing, nurse cropping, cover cropping, eradication of weeds, and rotation of crops; the treatment of slopes by contouring, terracing, vineyarding, retain-walling, annular forestation, and grading; and the treatment of the water supply by regulating its movement.

The author summarizes the requisites for the maintaining of a natural balance between cover, soil, and slope as "(1) to retain mulch and humus, partly to hold the waters of rains and snows, partly to temper and so increase the friability and sponginess of the soil; (2) to till deeply in order that the soil body may be kept open to free circulation of the soil fluid; (3) to select crops partly for the sake of affording cover for the longest practicable portion of the year, especially on steeper slopes; (4) to rotate crops partly for the sake of alternating long and short seasons of cover and so checking any erosion started by defective cover; (5) in the dearth of vegetal mulch, to maintain a dust mulch tending to check evaporation from the surface and thus to promote circulation through the crop plants; and (6) on all steeper slopes to plow and plant on contours, thereby closing gullies and channels and retarding run-off. . . .

"The several modes of treatment designed to remedy or prevent soil erosion are alike in principle—all operate through regulating the movement of water. The primary object is conservation of both solid and fluid parts of the soil through a balanced distribution of the water supply. The ideal distribution is attained when all the rainfall or melting snow is absorbed by the ground or its cover, leaving none to run off over the surface of field or pasture; in which case the water so absorbed is retained in the soil and subsoil until utilized largely or wholly in the making of useful crops, while any excess either remains in the deeper subsoil and rocks as ground water or through seepage feeds the permanent streams. Although this ideal distribution can commonly be brought about by proper treatment, it frequently fails on account of (*a*) inequality of supply, (*b*) catastrophic storms, (*c*) defective drainage, and (*d*) thriftless farming. In these cases the evil may be palliated rather than prevented, and by collective rather than individual action."

Investigations on the chemical and mechanical composition of pine forest soils and analyses of ash of pine trees, J. Vityn (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 2, pp. 171–203*).—The results of the work here reported showed that the total amounts of phosphoric acid, lime, and potash soluble in hydrochloric acid were much larger for podsol soils underlain with clay strata than for soils over sand strata. All soils underlain with sand strata were similar in their phosphoric acid, lime, and potash content, and the difference in growth of pine trees may possibly be explained by the difference in marshiness of the soil, the latter factor influencing also the process of soil formation, especially with regard to the distribution of the aluminum and iron oxids.

Increasing marshiness tends to reduce the iron oxid (Fe_2O_3) content in the upper humus layer of the soil. In podzol soils the aluminum and iron oxids tend to accumulate nearer the surface than in marshy soils (peaty podzol soils). The aluminum oxid was deposited at a greater depth than the iron oxid. Podzol soils contained substantially the same quantities of iron and aluminum oxids in the hardpan (ortstein) layer, whereas marshy soils contained less aluminum oxid than iron oxid, a considerable part of the former seemingly being carried away with the drainage water.

The ash content was highest in pine trees from marsh soil forests, the heart wood containing somewhat more ash than the sap wood. This is contrary to the usual observation and may be due to the fact that the trees were relatively young (70 years old).

The use of soils east of the Great Plains region, M. Whitney (*U. S. Dept. Agr., Bur. Soils Bul. 78, pp. 292, pl. 1, figs. 16*).—The purpose of this bulletin is to indicate the proper use of soils in the production of the several staple farm crops, dairy products, fruits, and vegetables, based upon the work of the Bureau of Soils, which, up to January 1, 1910, covered 105,613,576 acres in the following soil provinces: Atlantic and Gulf Coastal Plains 32,576,360 acres, Piedmont Plateau 10,306,426 acres, Glacial and Loessial 24,562,696 acres, Glacial Lake and River Terrace 7,586,286 acres, Limestone Valleys and Uplands 7,666,814 acres, Appalachian Mountains and Plateau 10,158,817 acres, and the River Flood Plains 12,756,177 acres. An attempt is also made to bring out plainly the relationships and essential differences of the soils and to work out their genetic classification. A complete list of changes in names necessary to the perfecting of the classification is given.

The Cecil sandy loam, J. A. Bonsteel (*U. S. Dept. Agr., Bur. Soils Circ. 27, pp. 19*).—This is the fifth of a series of circulars on soils of the Eastern United States and their use, and deals with the Cecil sandy loam, of which an aggregate of 3,143,960 acres in 29 different areas located in 5 States has been surveyed by the Bureau of Soils.

The Cecil clay, J. A. Bonsteel (*U. S. Dept. Agr., Bur. Soils Circ. 28, pp. 16*).—This is the sixth of a series of circulars on soils of the Eastern United States and their use, and deals with the Cecil clay, of which a total of 2,490,627 acres in 32 different areas located in 7 States have been surveyed by the Bureau of Soils.

The Hagerstown loam, J. A. Bonsteel (*U. S. Dept. Agr., Bur. Soils Circ. 29, pp. 18*).—This is the seventh of a series of papers on soils of the Eastern United States and their use, and deals with the Hagerstown loam, of which 1,211,911 acres in 24 different areas in 5 States has been mapped by the Bureau of Soils.

The heaths of Uckermünde, H. Seelheim (*Die Ueckermünder Heide. Inaug. Diss. Univ. Greifswald, 1910, pp. IX+116, pl. 1, figs. 10, map 1*).—This is a thesis sumbitted for the degree of doctor of philosophy at the University of Greifswald. The author discusses the extent, topographic features, formation, vegetation, settlement, and commercial importance of the heath lands surrounding Uckermünde, Pomerania. The character of the soil and the changes it has undergone are discussed. A bibliography is appended.

Moor culture plat experiments, 1910, H. von Feilitzen and A. Bauman (*Svenska Mosskulturfor. Tidskr., 25 (1911), No. 2, pp. 157–173*).—Experiments on [illegible]5 plats in 18 different counties in Sweden were arranged for by the association. The experiments included tests of soil amendments and fertilizer and variety tests with small grains and soiling and hay crops.

The problem of "bare patches," W. A. Hargreaves (*Jour. Dept. Agr. So. Aust., 14 (1911), No. 9, pp. 836–846*).—The author reports the results of chemiical analyses and of pot tests of soils from different localities of South Australia to determine the cause of the infertile portions (bare patches) of these soils.

It is concluded that the sterility is due to excessive quantities of soluble salts. Chlorids and sulphates seemed to predominate. The probable action of the soluble salts in retarding plant growth is discussed.

Carbon bisulphid as soil renovator, C. J. J. van Hall (*Tevsmannia, 22 (1911), No. 2–3, pp. 152–162*).—This is a brief review of experiments by other investigators.

Citrus experiments, A. W. Blair (*Florida Sta. Rpt. 1910, pp. XXV–XXXIV, figs. 6*).—This is a brief account of the plan and progress of these experiments, dealing especially with the fertilizers used, the installation of air and soil thermographs, the composition of soils used and of orange leaves and stems grown on the experimental plats, and the installation of soil tanks for supplementary studies on the fertilizer requirements of citrus fruits (E. S. R., 25, p. 117).

Heavy root feeding and the dungheap, J. Hendrick (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 32–39*).—It is shown in this article that about 85 per cent of the nitrogen consumed by animals in case of heavy feeding with roots is lost in the form of liquid manure, this loss being much greater than in the case of feeding with linseed cake or other concentrated nitrogenous feeding stuffs.

The production, control, and use of commercial fertilizers, T. Alexander (*Österr. Chem. Ztg., 14 (1911), No. 7, pp. 82–87; abs. in Chem. Zentbl., 1911, I, No. 18, pp. 1374, 1375*).—This is a general review of the subject with special reference to Austrian conditions.

Vegetation experiments with miscellaneous materials used as direct or indirect fertilizers, J. G. Lipman, P. E. Brown, and I. L. Owen (*New Jersey Stas. Rpt. 1909, pp. 183–208, pls. 7*).—Pot tests of "phospho-plaster," a by-product of superphosphate manufacture, low-grade rock phosphate, peat, calcium carbonate containing a small amount of borates, gypsum containing boric acid, and greensand marl are reported.

The peat tested in these experiments was from a deposit in Warren Co., N. J., which is being exploited as a fertilizer and fertilizer filler and contained, sun-dry, 1.66 per cent of nitrogen, and "bone-dry," 2.66 per cent of nitrogen. In experiments with rye "the application of 1 gm. of nitrogen in the form of sun-dry humus increased the yield of dry matter from 2.15 gm. to 7.6 gm., while 2 gm. of humus nitrogen increased it to 11.4 gm., and 3 gm. to 13.5 gm. of dry matter. A similar increase occurred also in the pots where bone-dry humus was used, except that the absolute yields were not as large. Furthermore, the increasing amounts of humus increased the proportionate amount of nitrogen in the dry matter. . . . The nitrogen of the sun-dry humus was more available than that of the bone-dry humus. Evidently the drying of the material at higher temperatures reduced still further its resistance to the decomposition processes in the soil. At best, however, the availability of the humus nitrogen was very low. The highest recovery of the applied nitrogen was only 7.17 per cent in the case of the sun-dry humus, and only 5.17 per cent in the case of the bone-dry humus."

The authors estimate on the basis of their results that the peat experimented with is worth not more than $1 per ton as a fertilizer, "a price at which its commercial exploitation could not be made profitable." It may be used more profitably as a litter or fertilizer filler. "There is no objection to the use of peat as a filler in complete fertilizers or as a diluent in incomplete fertilizers, like dried blood, provided that no attempt is made to charge for the peat nitrogen the same price that is charged for dried blood nitrogen. Unfortunately this is exactly what is being done in many instances."

The results with greensand marl were inconclusive and with the other materials not of general interest.

Experiments with different nitrogenous fertilizers for spring grains and root crops, F. Hansfn (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 5, pp. 693–731*).—The fertilizers experimented with were nitrate of soda, Norway saltpeter (calcium nitrate), calcium cyanamid, sulphate of ammonia, and liquid manure. The experiments were conducted during the years 1904 to 1909 at six of the Danish experiment stations.

The average effects of the different systems of fertilization for all fields and years were as follows, the value of the nitrate of soda being placed at 100: Norway saltpeter 79 and 88 for roots and spring grains respectively, ammonium sulphate 71 and 96, calcium cyanamid 42 and 74, and liquid manure 65 and 72. The average effect of calcium cyanamid on fields in which the fertilizer was plowed under was 68.

The after effects of the various fertilizers observed during the season of 1910 were not marked, but appeared especially after calcium cyanamid and ammonium sulphate. Cooperative trials with these fertilizer materials conducted by county agricultural societies gave results that agreed well, on the whole, with the averages obtained at the experiment stations.

As to methods of application, nitrate of soda gave slightly better results both for roots and small grains when one-half was plowed under and one-half used as a top-dressing, while the largest yields were obtained with the other mineral fertilizers when these were plowed under.

Cyanamid in complete fertilizers (*Amer. Fert., 34 (1911), No. 12, pp. 46, 47*).—Directions are given for the mixing of cyanamid with other fertilizing materials in the preparation of complete fertilizers. A table is given which shows the amounts of cyanamid which must be used to furnish different percentages of ammonia in fertilizer mixtures.

After effects of phonolite as a potash fertilizer, S. Rhodin (*K. Landtbr. Akad. Handl. och Tidskr., 49 (1910), No. 8, pp. 691–695*).—The after effects of phonolite were studied with grass and green oats in three different series of trials. The solubility of the potash was not found to have increased during the second season, and both these experiments and recent trials conducted by the Swedish Moor Culture Society show that ground phonolite can not replace the Stassfurt salts, which are immediately available, effective, and cheaper as potash fertilizers.

Potash in China, L. Bergholz et al. (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 141, pp. 1228, 1229*).—Reports from consular agents in different parts of China are given which show that there is considerable domestic trade in potash derived from wood ashes in various Chinese provinces. An apparently unverified report that potash deposits have been discovered in Shantung

Province is referred to. There is no information as to the occurrence of such deposits in other provinces.

The settlement of the potash controversy (*Chem. Indus.* [*Berlin*], *34* (*19[illegible]*), *No. 11, pp. 305, 306*).—The terms on which the disagreement between the potash Syndicate and American purchasers was settled on May 21 are briefly stated.

Preparation of dicalcium phosphate, P. Palmaer (*Teknisk Tidsskr.*, *40* (*19[illegible]*), *p. 157; abs. in Chem. Ztg.*, *35* (*1911*), *No. 11, Repert.*, *p. 43*).—The preparation of dicalcium phosphate by treatment of crude phosphate with acid obtained by electrolysis of sodium chlorate or perchlorate with the subsequent regeneration of the electrolyte is described in this article. The phosphoric acid of the dicalcium phosphate obtained by this process was 35 per cent soluble in citrate solution.

On the after effects of phosphate, H. G. Söderbaum (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 37, pp. 22, figs. 6; K. Landtbr. Akad. Handl. och Tidskr., 50* (*1911*), *No. 3, pp. 218–236, figs. 6*).—Comparative experiments with oats and barley fertilized with superphosphate, dicalcium or tricalcium phosphate, or bone meal, applied either with or without lime, showed that during a period of five years insoluble phosphates applied the first year produced an increase in crop yield amounting to about 70 per cent of that obtained during the same time by a corresponding amount of soluble phosphoric acid (superphosphate) which was likewise given the first year only. In cases where the conditions, especially the lime factor, were less favorable for the assimilation of the insoluble phosphoric acid, the increased yield was only 10 per cent or less. In the opinion of the author it may properly be questioned whether the after effects of insoluble phosphates are of sufficient practical importance to be considered in the calculation of the market value of bone meal and triphosphates.

Use of lime on land ([*Philadelphia*], *1911, 7. ed., pp. 8*).—This is the seventh edition of a small pamphlet "edited by the school of agriculture and experiment station of the Pennsylvania State College," giving directions regarding the use of lime on land and a list of dealers in agricultural lime, ground limestone, and fertilizers in Pennsylvania.

Fertilizers, C. S. Cathcart (*New Jersey Stas. Rpt. 1909, pp. 15–23*).—This is a brief report on fertilizer inspection in New Jersey in 1909 reported in detail in Bulletins 223 and 224 of the station (E. S. R., 22, pp. 228, 625), and which involved analyses of 762 samples of complete fertilizers representing the product of 108 manufacturers, besides samples of miscellaneous fertilizing materials. Tables are given showing the wholesale cost per pound of fertilizing constituents in raw, unmixed materials, and the quality of the different brands of fertilizers examined.

Tabulated analyses of commercial fertilizers, W. Frear (*Penn. Dept. Agr. Buls. 199, pp. 105; 203, pp. 75*).—These bulletins give the results of analyses and valuations of fertilizers examined under state law in Pennsylvania during 1910. Of the 730 samples of complete fertilizers examined during 1910, 230 were deficient in one or more constituents.

AGRICULTURAL BOTANY.

Plant physiology, B. M. Duggar (*New York, 1911, pp. XV+516, figs. 145*).—This is one of the Rural Text-Book Series, and it is designed for the use of students and general readers who are interested in the fundamental requirements of plants.

The book treats of plant physiology with special reference to plant production. It does not pretend to treat exhaustively any topic but offers a wide range of material showing plant behavior under all conditions. As such it should be of value in agricultural, horticultural, and other classes where a knowledge of plant activity is of high importance as a part of the training for practical and rural life. The different chapters are followed by series of suggestive laboratory exercises for students by which the principles described are clearly demonstrated. References to special articles are freely given, and numerous textbooks are cited for fuller discussions of the principles involved. A feature of the work is the frequent use of illustrative material from plants that are familiar and directly useful rather than the standard illustrations drawn from rare and often unattainable material.

The plant cell, H. A. Haig (*London, 1910, pp. IX+207, table 1, pls. 12, figs. 112*).—The text deals with the study of structural and physiological botany from a biological standpoint. The working substance of a cell, the protoplasm, is given first place in importance, and the subsequent changes in form, function, etc., are looked upon as being due to the protoplasm under the stimulus of various physical and chemical forces.

Studies on the influence of low temperatures on plant cells, E. Schaffnit (*Ztschr. Allg. Physiol., 12 (1911), No. 3, pp. 323–336*).—Previously noted from another source (E. S. R., 24, p. 533).

The water supply and the osmotic pressure conditions of desert plants, H. Fitting (*Ztschr. Bot., 3 (1911), No. 4, pp. 209–275*).—This is an extended investigation of the means by which desert plants obtain their water, special attention being given to the water-absorbing power of certain desert species as indicated by their intensified osmotic pressure.

The results are given of tests of the osmotic pressure of plants of stony deserts, of extremely dry, rocky deserts, of desert plants when grown in damp soils, of plants growing on very saline, wet soils, of dune plants, and of some plants from the Desert of Oued Biskra.

It is claimed that neither annual nor perennial plants in the Sahara Desert replenish their loss of water from dew, as there is no dew in this region, and also that only to a limited extent can most of the perennial desert plants draw on the very deep ground water, because the soil conditions for many of the common kinds of plants are such as to make it impossible for their roots to penetrate to any great depth. Careful studies of the vegetative conditions of desert plants force the conclusion that in such dry deserts as the Sahara the water supply of perennials which have no storage tissues must come from the upper dry-soil layers. It is also stated that in very dry years the nonxerophytic annuals obtain their water supply from the uppermost dry-soil layers.

From the author's observations and investigations it seems probable that perennial desert plants have developed distinct adaptations and devices to draw from the very dry soil the necessary moisture for plant growth. Such adaptation would be the development of a very high osmotic pressure by which means the plant would be enabled to absorb water from even the dry soil. It was found that the osmotic pressure of many of the desert plants (a list of which is given, together with their osmotic pressures) was very high, and varied materially for the different species tested.

Of the 46 species investigated, 21 per cent had an osmotic power of 3 gm. of potassium nitrate, which is equivalent to a pressure of 100 atmospheres, 35 per cent had a pressure greater than 1.5 gm. (53 atmospheres), 52 per cent had a pressure higher than 1 gm., and only 11 per cent had an osmotic pressure as low as 0.3 to 0.6 gm. The lowest pressures were found in the annuals, and the highest in the shrubs. Of the 10 species with a pressure of 3 gm. or more, 6 were found to be very rich in sodium chlorid. No positive relationship was found to exist between the formation of water reservoir tissues and the osmotic pressure of desert plants.

The author concludes that perennial plants of the extreme desert type develop a high degree of osmotic pressure, that many of them have the power to regulate this pressure according to the dryness of the region in which they grow, and that both of these characters enable the plants to withdraw moisture from very dry soils.

Contribution to the study of circulation: Studies on the sweet potato (Ipomoea batatas), B. H. A. GROTH (*New Jersey Stas. Rpt. 1909, pp. 343–350, pls. 3*).—This paper is a preliminary report of an investigation of the reversal of the water current caused by withholding water from the lower joints and supplying it to the upper ones of a sweet potato vine grown in a hothouse. A piece of the main stem with a side branch was potted and subsequently at intervals of 2 ft. the growing vine and branches were rooted in pots, and the effects of withholding water from the main stem but supplying it to the rooted subdivisions of the branches were noted.

It was found that a reversal of the water current occurred by which the entire system of the main stem and side branches was enabled to grow from water supplied to the pots in which the side branches were rooted. The roots of the main stem increased in size when in perfectly dry soil, thereby proving, so the author holds, that rooted branches of the sweet potato may, under certain conditions, help to increase the root crop of the main plant.

On the metabolism of ripening seeds, W. ZALESKI (*Bot. Centbl., Beihefte, 27 (1911), 1. Abt., No. 1, pp. 63–82*).—The results are given of investigations on the metabolic changes that occur during the ripening process of seeds as influenced by light, dampness, oxygen, and temperature conditions, especially with reference to the nitrogenous compounds formed in the seeds.

The effect of light and changes in temperature on the germination of seed and the influence of the water content of the seed in this connection, L. PICKHOLZ (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 2, pp. 124–151, fig. 1*).—The observations made by the author showed that the seed of *Poa pratensis* germinated normally in the dark only when heated for a time, but that when the heat was applied constantly at either 20 or 28° C., normal germination did not take place. The influence of direct sunlight was mainly due to the heat rays which brought about a temporary increase in temperature. The light rays also were observed to exert a slight influence upon germination, which is considered as possibly due to their transformation into heat. Under constant temperature conditions the seed of Poa did not germinate normally even in direct sunlight when the heat rays were excluded. The effect of the change of temperature was the same in different stages of maturity.

It was further observed that in general the water content of the seed was in inverse proportion to the percentage of germination. In most cases when water was driven off the germination of the seed was benefited, while an addition of water in most cases proved unfavorable, although there were some instances in which it remained indifferent and a few in which it proved advantageous.

Photosynthesis and the production of dry matter in white and in colored light, W. LUBIMENKO (*Rev. Gén. Bot., 23 (1911), No. 265, pp. 1–14*).—As a result of his experiments the author claims that for the production of dry matter by green plants there is an optimum light requirement, but that its absolute value is less than that which the chlorophyll apparatus needs to perform the maximum of photo-chemical work as expressed by the decomposition of carbon dioxid.

The energy of the decomposition of carbon dioxid for a green leaf in a colored light depends upon the absorption of the different colors by the chlorophyll in regard to their calorific energy. The true fixation of carbon by a plant expressed by the increase in dry matter in the course of its growth is unequally influenced by the different rays of the solar spectrum. The maximum of dry matter corresponds to the blue violet rays and not to the red rays of the spectrum. The increase in dry matter with the yellow orange rays was less than that of the red and is least with the green rays.

If photosynthesis is divided into 2 parts, then the first stage is characterized by the decomposition of carbon dioxid and the synthesis of the first organic products. The plants utilize to a great extent during this stage the red rays of the solar spectrum.

The second stage is characterized by the definite fixation of the primary organic substances elaborated in the green cells, and the plant employs for this work the blue violet rays.

Pigment formation in cultures of Azotobacter chroococcum, W. L. Omeliansky and O. P. Ssewerowa (*Centbl. Bakt.* [etc.], *2. Abt., 29 (1911), No. 23–25, pp. 643–650, fig. 1*).—After a review of the literature on this subject, the authors give the results of their experiments on pigment formation by *A. chroococcum.*

It was found that certain strains of this bacterium were characterized by the formation of pigment which was more quickly produced when old, brownish cultures were used as a source of inoculating material. This pigmentation occurred best at an optimum temperature of about 30° C., under well aerated conditions, and in a dextrin agar medium to which lime carbonate had been added. The pigment is insoluble in the usual solvents, but can be dissolved in the presence of an alkali.

On the relative amount of mineral foods in soils and their relationship to plant growth, D. Dezsö (*Verhandl. Internat. Agrogeol. Konf.* [*Stockholm*], *2 (1910), pp. 178–196*).—In a study of the relationship of mineral foods to plant growth the author found that the greater the relative amount of soluble mineral foods in the soil compared to the soil moisture present, the more vigorous was the plant growth on such soils; that is, the denser the mineral food solution of a given soil, which density is dependent upon the available amount of soluble salts and on the average water content of the soil, the more food would the plants have, and therefore the more vigorously would they grow.

The retention of mineral matter by annual plants; the distribution of the fixed elements, G. André (*Compt. Rend. Acad. Sci.* [*Paris*], *152 (1911), No. 14, pp. 965–967*).—In previous papers (E. S. R., 25, p. 325) the author gave the results of investigations on the retention of mineral matter by annual plants and on the distribution of dry matter, total ash, and nitrogen content. In this article the distribution of the phosphoric acid, potash, lime, and magnesia in each organ is given for 5 different periods in the growth of the plant.

The distribution of the phosphoric acid was found to be more regular than that of the nitrogen, and reached its absolute maximum weight in roots, stems, and leaves at the beginning of the fruiting period, when it diminished to the end of the growth of the plant. In the fruits the phosphoric acid increased with the same rapidity as the nitrogen during the active period of maturation. The potash varied essentially the same as the nitrogen. The lime and magnesia increased in absolute weight in all the organs, but toward the close of the plant growth the weight of these 2 bases diminished in the leaves.

The relationship of organic phosphorus to amido-nitrogen and to nonproteid nitrogenous compounds in ripe seeds, A. Parrozzani (*Rend. Soc. Chim. Ital., 2. ser., 1 (1909), pp. 205–207*).—As the result of experiments with the ripe grain of maize on the relationship of organic phosphorus to certain organic nitrogenous compounds, it is claimed that the production of amido-nitrogen and other nonproteid nitrogenous substances is proportionate to the amount of phosphoric acid present in the seeds, especially the phosphoric acid of Posternak. The author believes that Posternak's phosphoric acid is a combination of phosphorus with inosit, that lecithin is a combination of phosphorus with glycerin, stearic acid, and collin (colina), and that lecithin represents the final stage by which nonnitrogenous organic substances acquire the power of combining with nitrogen, especially with amino acids, for the synthesis of albuminoid substances.

On the utilization by higher plants of various organic nitrogenous substances, M. Molliard (*Bul. Soc. Bot. France, 57 (1910), No. 7, pp. 541–547*).—In the experiments here recorded on the absorption by the roots and the utilization by the plants of organic nitrogenous compounds, the author investigated 3 main points, viz, (1) the action of various organic nitrogenous substances on the development and production of fresh and dry matter, (2) the total nitrogen content of plants thus grown, and (3) the formation of protein substances from the absorbed nitrogen.

The following substances were used in the culture media in the ratio of 1:1,000 parts: Urate of sodium, aspartic acid, asparagin (1:500), glycocoll, legumin, cyanid of sodium, amygdalin, hydrocyanic acid, leucin, tyrosin, myronate of potassium, and alanin. Of these substances the first 9 were utilized by the plants as shown by the increase in fresh and dry matter over similar plants grown as checks. This utilization was greatest by the urate of sodium, and decreased in the order named down to leucin. Tyrosin, myronate of potassium, and alanin were toxic to the roots. The amount of proteid nitrogen found in seedlings grown in the presence of asparagin and glycocoll was about twice the total nitrogen content of the ungerminated seeds.

The action of useful and injurious stimulants on the respiration of living and dead plants, N. Ivanov (*Biochem. Ztschr., 32 (1911), No. 1, pp. 74–96, fig. 1*).—In continuation of previous investigations (E. S. R., 24, p. 138) the author has carried on experiments on the action of inorganic phosphorus compounds, the autolytic products of yeast cells, quinin, sodium selenate, arbutin, and other substances on the respiration of living and dead wheat seedlings, and on the etiolated tips of beans.

It was found that 1 and 2 per cent solutions of disodium phosphate did not stimulate respiration in the living bean tips, but that when killed by freezing an increased respiration was apparent, amounting to 27 per cent for the 1 per cent solution of the phosphate and 62 per cent for the 2 per cent solution. The increased output of carbon dioxid was at the expense of the primary anaerobic processes. The phosphate did not produce on the dead tissues any increase of respiration in the secondary oxidation process.

These experiments, it is claimed, furnish a new proof of the genetic connection between the primary anaerobic and the secondary oxidation stage of the respiration processes in the higher plants. The increased carbon dioxid output can not be ascribed to a stimulating action of the phosphates, as the increase also occurred with dead tissues. In the experiments with yeast it was found that the autolytic products favored principally the primary anaerobic respiration stage. The quinin increased the carbon dioxid output of the living tissues, but on the dead tissues it acted either as a poison or had no influence. The other substances tested depressed the respiration of both living and dead tissues.

The action of methyl alcohol and other alcohols on green plants and micro-organisms, T. Bokorny (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 1–3, pp. 53–64*).—The results are given of experiments on the growth of various plants in culture media to which certain percentages of different alcohols had been added.

It was found that phenols in general were more unfavorable to plant growth than the true alcohols of the fatty series. In most instances no vegetation was able to grow in the presence of the phenols, with the exception of a slight growth of mold which occasionally developed. Of the alcohols of the fatty series, methyl alcohol proved a good source of carbon for many bacteria and fungi, and for some green plants. Beans and peas in water cultures containing 0.5 to 1 per cent solutions of methyl alcohol made a better growth than control plants grown in only a mineral food solution. Pot plants of beans, peas, grain, etc., also showed a positive increase in growth when watered with methyl alcohol solutions.

Ethyl alcohol was able to furnish food for bacteria, but not for the higher plants.

Investigations on the effect of formaldehyde on green plants, V. GRAFE (*Ber. Deut. Bot. Gesell.*, *29* (*1911*), *No. 2*, *pp. 19–26*, *figs. 2*).—In continuation of a line of experiments previously reported (E. S. R., 22, p. 280) studies have been made on the effect of formaldehyde gas on green plants.

The seedlings (*Phaseolus vulgaris*) were grown in pots, the soil of which was prevented from absorbing any of the formaldehyde gas by a coating of Stanniol and vaseline, or of paraffin. Comparisons were made between the growth in the formaldehyde vapor without the presence of carbon dioxid and in an atmosphere containing carbon dioxid.

It was found that the formaldehyde not only acted as a stimulant but was really assimilated by the plants and changed into organic matter in the form of reducing sugar.

The nature, distribution, and effects upon vegetation of atmospheric impurities in and near an industrial town, C. CROWTHER and A. G. RUSTON (*Jour. Agr. Sci.*, *4* (*1911*), *No. 1*, *pp. 25–55*, *figs. 3*).—The results are given of investigations and observations made during the years 1906 to 1910 at the Manor Farm, at Garforth, and in the city of Leeds, which comprised analyses of rain-water samples and studies of the effects on vegetation of certain atmospheric impurities, such as smoke, acid waters, etc. Special attention was given to the effects of smoke-laden atmosphere upon the intensity of light, the relative assimilatory power of leaves in different localities, the effects of acid waters upon the growth of grass, and the bacteriological condition of the soils.

It was found that the atmosphere in the vicinity of a large industrial city, such as Leeds, is relatively highly charged with impurities, many of which exert a marked injurious effect upon plant growth. The rain water in such regions was found to be notably rich in suspended matters, such as chlorids, sulphates, and other sulphur compounds, nitrogenous compounds, and free acid. The suspended matters in the air impeded plant growth, not only by their deposition upon the leaves and the consequent hindrance to the free interchange of gases between the leaves and the air, but also by reducing the light intensity, which reduction in some instances amounted to fully 40 per cent of the maximum light available. The free acid present in the atmosphere was found to be detrimental to plant growth by its direct action on the leaves, and also indirectly by reducing the ammoniacal fermentation of the soil humus, and by decreasing the activity of the nitrifying and nitrogen-fixing soil organisms. In an experiment with timothy the continued application of the acid rain water produced plants distinctly poorer in protein but richer in crude fiber.

On the systematic position of Zea mays as indicated by atavisms produced by smut infection (Ustilago maydis), H. ILTIS (*Ztschr. Induktive*

Abstam. u. Vererbungslehre, 5 (1911), No. 1, pp. 38–57, pls. 2, fig. 1).—In a general discussion of the origin of corn (*Z. mays*) as to whether it is a direct descendant of *Euchlæna mexicana* or was directly evolved from some member of the tribe Andropogoneæ, the author holds that the traumatisms produced in corn by smut indicate that it is descended from the Andropogoneæ.

On injurious bacterial conditions in soils and on soil purification, R. Emmerich, Wilhelm Graf zu Leiningen, and O. Loew (*Centbl. Bakt.* [*etc.*], *2. Abt., 29 (1911), No. 23–25, pp. 668–683, figs. 2*).—Under the head of injurious bacterial conditions in soils the authors discuss the conditions under which desulphurization, denitrification, and acid formation in soils occur, and give the results of experiments with various species of bacteria that play a rôle in these processes.

Some bacteriological relations in soils kept under greenhouse conditions, J. G. Lipman and I. L. Owen (*New Jersey Stas. Rpt. 1909, pp. 211–222*).—Previously reported from another source (E. S. R., 24, p. 327).

On nitrate and nitrite assimilation, O. Baudisch (*Ber. Deut. Chem. Gesell., 44 (1911), No. 8, pp. 1009–1013*).—The author claims as a result of his investigations that nitrate and nitrite assimilation by green plants is a light-chemical process.

International catalogue of scientific literature. R—Bacteriology (*Internat. Cat. Sci. Lit., 8 (1911), pp. VIII+636*).—This is in continuation of the series of catalogues of scientific literature (E. S. R., 21, p. 728), the literature indicated being mainly that of 1908. About 6,500 titles are given, of which less than 100 are to American publications.

FIELD CROPS.

[Tests of field crops], J. M. Scott (*Florida Sta. Rpt. 1910, pp. XVIII+XXIV*).—The experimental data reported on Japanese cane have been already noted (E. S. R., 24, p. 733).

In a test of 8 corn varieties Georgia and Rawls produced the highest average yields, 20.06 and 18.2 bu. per acre, respectively. In a test of 20 varieties of sorghum Nos. 22330 and 24130 produced the highest yields, 13.73 and 13.47 bu. per acre, respectively. The seed distributed to the farmers of the State was Gooseneck and Sumac "which have been proved to be good varieties for Florida conditions."

Two cuttings of guinea grass gave a total yield for the season of 3,759 lbs. per acre of cured hay, while Para grass after an application of 37½ lbs. of dried blood, 75 lbs. acid phosphate, and 28 lbs. muriate of potash yielded 3,961 lbs. of cured hay per acre.

In a test of 19 sweet potato varieties White Seedling No. 15 and Sugar Yam No. 5 gave the highest yields per acre, 116.24 and 108.74 bu. per acre. Beardless barley and hairy vetch sown together for winter pasture made a better growth than (1) Appler oats and English winter vetch, (2) crimson clover, or (3) white-blooming crimson clover.

Selected velvet bean seeds from which faulty and immature seeds had been rejected produced 33.79 bu. of shelled beans per acre as compared with 28.37 bu. secured from unselected seed. On an acre used for continuous planting the yield was only 1,137 lbs. of beans in the pod or 11.37 bu. of shelled beans. The Lyon bean gave an average yield of 17.37 bu. per acre and appears to be but little different from the velvet bean in feeding value.

Among 110 varieties of cowpeas 12 "showed strong indications of being resistant to both root-knot and wilt." An acre of ground planted to kudzu in

March, 1909, and not cut for hay during that year had made a growth of 2 ft. by March 16, 1910, and of from 12 to 15 ft. by May 4.

Report of assistant botanist, J. Belling (*Florida Sta. Rpt. 1910, pp. LXXIX–XCII, figs. 6*).—These pages report the results of an attempt to secure a hybrid that would combine the thin unopening hull of the velvet bean with the Lyon bean's smooth pods which do not have the objectionable stiff irritating bristles.

In 1908 velvet bean flowers were fertilized with Lyon bean pollen. The pollen parent is thought to have been grown from seed received from the Philippine Islands. All pods borne by the hybrid plants grown in 1909 had so many loose irritating hairs that there was trouble in harvesting them, and they could be shelled comfortably by hand only after the bristles had been brushed off under water.

The author presents in parallel columns the principal characteristics of the velvet, Lyon, and hybrid beans and in tables statistical data showing the standard deviation and coefficients of variation of the length, breadth, and thickness of the bean, the length and breadth of the strophiole, and the coefficient of correlation between (1) length and breadth, (2) breadth and thickness of seed, and (3) between length of seed and length of strophiole. His conclusions following this data are briefly summed up as follows:

"The hybrid plants seem to derive the color of their 3 upper petals, the length of the bristles on the pod, and the thickness of the seeds from the velvet bean; while the stiffness of the bristles on the pod, the opening of the pods, the length and stoutness of the pods, and the length and breadth of the seeds seem to come from the Lyon bean. The mottling on the seeds of the hybrids varies from thickly mottled, like the velvet, to unmottled with veins like the Lyon, but the hue of the colored patches is a lighter brown than on the velvet bean. Whether these characters are truly dominant can only be told when the next generation shows whether they segregate or not. The coefficients of variation in the hybrid seeds are no greater than those of the seeds of the 2 parent strains, except as to the mottling.

"The close agreement of the length and breadth of the hybrid seeds with those of the Lyon bean, and of the thickness with that of the velvet, may possibly be genetic, or may be due to special conditions of growth."

Progress reports are given of an investigation of the causes of the premature falling of persimmons, the sugar content of the juice of West Indian cane, and corn breeding work. Of the 5 cane varieties tested "B. 208 was the earliest and ripest cane, and its juice gave 17.3 per cent of cane sugar by the polariscope" in October, 1909. Three kinds of field corn and 3 of sweet corn were sown with the reddish yellow West Indian corn from Cuba in the hope of selecting from the second and following generations types combining good ears with the sturdier constitution of the Cuban corn, its supposed resistance to the corn worm, and its considerably greater adaptability to the climate of southern Florida.

[New Jersey experiments with field crops], F. C. Minkler (*New Jersey Stas. Rpt. 1909, pp. 43–55, pls. 4*).—In a test of 3 varieties Silver King yielded 65.7 bu. of corn per acre, but in fodder yield was excelled by Boone County White with 13.2 tons. The average cost per ton of growing and harvesting alfalfa hay was $5.34 and of mixed hay $4.82. The cost of growing corn and cowpeas for silage was $2.61 per ton, while that of cutting the crop and filling the silo was $1.30 per ton.

Brief statements are also given of work with rye, wheat, oats, and peas, Japanese barnyard millet, cowpeas, flint corn, cabbages, and turnips, alfalfa, and fertilizers for silage corn and other crops.

Grass and clover seeds at Cockle Park, D. A. Gilchrist (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 102–112*).—Notes are given on Italian rye grass, tall oat-grass, meadow fescue, cocksfoot, timothy, red or broad-leaved clover, alsike clover, trefoil or yellow clover, and white clover. Progress reports deal with tests of grass seed mixtures and fertilizers and the production of the seed of wild white clover.

In a 3-year test, 3 out of 4 plats of grass seed mixtures showed higher average returns after the use of 10 cwt. of slag containing 200 lbs. of phosphoric acid than after (1) 10 tons of dung or (2) 10 tons of slag and 10 tons of dung.

Forage plant culture in Switzerland, A. Elofson (*Sveriges Utsädesför. Tidskr., 21 (1911), Nos. 1, pp. 27–53, pls. 5, figs. 6; 2, pp. 84–92*).—A report on observations made by the author during a visit to Switzerland, describing measures adopted by the Swiss government for the improvement of forage crops.

Report of cooperative variety tests and fertilizer experiments, Zealand, 1910, O. H. Larsen (*Ber. Landbofor. Virks. Planteavl. Sjælland, 1910, pp. 404, figs. 8*).—The report gives accounts of cooperative work for the advancement of agricultural crop production, conducted during 1910 by members of the county agricultural societies of Zealand. The experiments included 264 fertilizer tests and 206 trials with various agricultural crops, methods of sowing, time of sowing barley, and planting root crops. Experiments on the control of weeds and plant diseases are also reported.

Annual report of agricultural stations in charge of the deputy director of agriculture, Bengal, for the year 1909–10, F. Smith (*Ann. Rpt. Agr. Stas. Bengal, 1909–10, pp. 25, pl. 1*).—At Cuttack in a 3-year test of 8 fertilizer mixtures the highest jute yield followed an application of cow manure, superphosphate, kainit, sulphate of ammonia, and sulphate of magnesia. In a test of 9 different mixtures the highest rice yields followed applications of (1) cow manure, superphosphate, saltpeter, and sulphate of magnesia; (2) cow manure, superphosphate, and saltpeter; and (3) dhaincha treated as a green manure.

The author presents the results of other experimental work and the quantity of seeds distributed at Cuttack and 13 other experiment stations. Parallel columns give historical, geographical, meteorological, and soil data relating to the 14 stations.

Permanent and temporary pastures, M. J. Sutton (*London, 1911, pp. VIII+144*).—Full directions for growing and utilizing grasses, clovers, and certain sundry crops are accompanied by statements of the agricultural value and characteristics of 26 grasses, 7 clovers, and 6 sundry plants used for grazing, feeding, or making into hay.

The farm grasses of Ohio, C. G. Williams (*Ohio Sta. Bul. 225, pp. 151–174, figs. 10*).—The average annual yields in tons of hay secured during the period 1905–1910 from 8 of the 10 grasses dealt with in this bulletin were timothy 3.497, redtop 2.817, tall fescue 2.435, tall oat grass 2.247, orchard grass 2.197, meadow fescue 2.1, and perennial rye grass 1.822. Italian rye grass yielded 2.56 tons in 1910 and brome grass yielded from 1.45 tons in 1905 to 2.98 tons in 1910. Tables report in full the yields obtained, the cost of grass seed per acre, and analyses of each of these grasses. In separate discussions of the several grasses, historical information, suggestions as to rotation, seeding, harvesting, and utilization are given.

A heretofore unnoted benefit from the growth of legumes, T. L. Lyon and J. A. Bizzell (*New York Cornell Sta. Bul. 294, pp. 365–374*).—In the investigations reported in this bulletin it was found that timothy grown with alfalfa or red clover had a higher protein content than that grown without these legumes. Oats grown with peas also showed an increased protein content and the hay yield of mixed oats and peas was 4,375 lbs. as compared with [illegible] lbs. of oats grown alone.

Soil that had produced alfalfa for 5 years was higher in nitrate content than soil which had grown timothy during that period, and portions of the same plats kept bare of vegetation during the summer showed similar results. Ammonium sulphate was more rapidly nitrified in alfalfa soil than in timothy soil, indicating, in the opinion of the author, an influence of the plant on conditions favoring nitrification. The increased protein content of nonlegumes when grown with legumes is also attributed to this cause. Limed soil produced alfalfa containing a higher protein content than unlimed soil, and the weed *Erigeron annuus* grown on limed soil had a higher protein content when it was grown with alfalfa also.

The method used in making studies of the nitrifying power of soils is described. The results upon which the author bases his conclusions as to the relative protein content of nonlegumes when grown with and without legumes are summarized in the following table:

Relative protein content of certain nonlegumes grown with and without legumes.

Crop.	Companion crop.	Protein in dry matter.	Crop.	Companion crop.	Protein in dry matter.
		Per cent.			*Per cent.*
Timothy		12.75	Oat straw[b]		5.81
Do.	Alfalfa	15.56	Do.[b]	Peas	6.73
Do.[a]		9.00	Oat hay		7.63
Do.[a]	Alfalfa	9.69	Do.	Peas	8.45
Do.		17.19	Oats (grain)[c]		13.50
Do.	Clover	24.56	Do.[c]	Peas	14.06
Oat heads[b]		13.82	Oats (straw)[c]		3.60
Do.[b]	Peas	14.82	Do.[c]	Peas	5.12

[a] A later cut of timothy.

[b] Sampled when ready to cut for hay.

[c] Sampled in the field when ripe; not grown on the experiment station farm.

Grimm alfalfa and its utilization in the Northwest, C. J. Brand (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 209, pp. 66, pls. 2*).—A statement of the history and a description of Grimm alfalfa are followed by tables presenting meteorological data for Wertheim, Germany, from which locality it is supposed to have been imported, and various other localities in which it has been grown. Other tables present meteorological data for the periods and localities of the tests reported by the author. The following table briefly summarizes results obtained in some of these tests, made at the Minnesota Station:

Summary of winter resistance tests of alfalfa at St. Anthony Park, Minnesota.

Kind of alfalfa.	Season.	Percentage of winter loss.
Carver County, Minn., Grimm	1901-2	3.7
Commercial seed	1901-2	26.7
Do.	1901-2	56.0
Iowa seed	1901-2	15.4
Grimm, 4 strains	1903-4	20.5
Turkestan, 2 strains	1903-4	[illegible]
Commercial, 4 strains	1903-4	[illegible]
Source unknown, 1 strain	1903-4	[illegible]
Grimm, 4 strains	1905-6	[illegible]

Summary of winter resistance tests of alfalfa at St. Anthony Park, Minnesota—Continued.

Kind of alfalfa.	Season.	Percentage of winter loss.
Other than Grimm, 10 strains	1905–6	96.9
Ordinary (other than Grimm), 6 strains	1905–6	97.4
Turkestan, 3 strains	1905–6	99.7
Grimm, 4 strains	1906–7	[a] 15.7
Other than Grimm, 10 strains	1906–7	[a] 23.0
Ordinary (other than Grimm), 6 strains	1906–7	[a] 33.3
Turkestan, 3 strains	1906–7	[a] 0.0
Grimm, 4 strains	1906–7	18.8
Turkestan, 3 strains	1906–7	36.6
Ordinary, 7 strains	1906–7	90.8
Grimm, 7 strains	1908–9	[b] 4.7
"Baltic," 6 strains [c]	1908–9	[b] 5.8
Ordinary, 3 strains	1908–9	[b] 84.5
Grimm seed from 1905 and 1906 plantings (4 plats)	1908–9	2.3

[a] Total loss from all causes between the spring in which the count was made and the preceding spring, as the plants were not counted during the autumn. This is the percentage loss during these plats' second winter, the loss during the preceding season being reported just above in this table.

[b] Less for entire year.

[c] Selected by W. A. Wheeler at Highmore and Brookings, S. Dak.

The author summarizes data from sources already noted (E. S. R., 17, p. 355; 19, pp. 131, 330; 24, p. 142).

Near Tappen, N. Dak., in a test of the hardiness of 16 strains, Grimm seed from Minnesota and seed from Chinook and Billings, Mont., gave stands 90 per cent perfect, and seed from Clearwater, Nebr., and Lawrence, Kans., 85 per cent perfect stands. The plats were seeded in May, 1905, and the stand estimated in September, 1909, at the close of the fifth season. "Many of the strains included in this experiment were duplicated in the experiments at Dickinson, N. Dak., and there is a general agreement in behavior as to cold resistance at the 2 places." The Eifeler lucern, from a point in Germany near the home of Grimm alfalfa, was included in this test. It is practically identical in its botanical characteristics with Grimm alfalfa, but its physiological behavior in the Tappen test was altogether different, as the stand September, 1909, was only 5 per cent perfect. All the plats were cut for seed in August, 1909, and the best, including the Grimm and Montana strains, yielded about 2½ bu. per acre. "The work at Tappen indicates that in the drier portions of North Dakota farmers who desire to grow alfalfa, and who can not obtain Grimm seed, should use either Montana or Nebraska strains."

At Fayetteville, N. Y., a similar series of alfalfa varieties and strains was tested. In 1906 Grimm gave a total yield of 7,450 lbs. as compared with 3,340 lbs. for Turkestan. In 1907 Grimm yielded 5,440 lbs. as compared with 4,820 lbs. from Utah nonirrigated seed No. 12409 and 2,300 lbs. from Turkestan. These figures indicate, in the author's opinion, that Grimm can be depended upon for its hay-yielding capacity as well as on account of superior hardiness.

Experiments at Bozeman, Mont., indicate that the Grimm alfalfa "is decidedly the best for many sections of the State."

At Indian Head, Saskatchewan, Canada, among 9 alfalfas sown in May, 1905, S. P. I. No. 12991 (Carver County, Minn., Grimm) had about 95 per cent of the stand remaining in the spring of 1906 as compared with 60 per cent of S. P. I. No. 11211 from Samarkand, Turkestan, and 50 per cent each of S. P. I. Nos. 13291 and 13259. The seed for the last 2 samples was grown at Fayetteville, N. Y., and Milburn, Nebr., respectively. During the period 1904–1909, 6 alfalfas were tested at Indian Head. In 1906 Grimm produced at 2 cuttings

7,112 lbs. as compared with 3,740 lbs. for Turkestan. In 1908, however, it was slightly exceeded by S. P. I. No. 13291. In 1909 it produced a higher yield than any other variety at the first cutting, but the second crops were put into the silo without weighing. In 1906 Minnesota Grimm was the only variety not injured by frost, and in 1908 the superintendent of the Indian Head experimental farm stated that from the first of the experiments "Grimm alfalfa has never been winter or spring killed in the least."

The author reports the experiences of numerous farmers who have had good results with Grimm alfalfa, discusses its forage and seed producing capacity, general behavior, temperature relations, and drought resistance, and summarizes its behavior, stating that in the North its effective growth begins earlier and continues later than that of any other strain successfully cultivated there, and that it has unusual vigor, earliness, and yielding power in seed production. It is up to the average in drought resistance and in Minnesota usually produces 3 good hay crops and enough additional growth for pasture or hog feed.

Suggestions for beginners in alfalfa culture, A. T. Wiancko (*Indiana Sta. Circ. 27, pp. 7*).—Directions are given for producing and using alfalfa in Indiana.

Barley: Growing the crop, H. B. Derr (*U. S. Dept. Agr., Farmers' Bul. 443, pp. 48, figs. 17*).—The author presents an illustration of a new hybrid awnless barley (E. S. R., 24, p. 335), which he calls Arlington Awnless. The principal topics dealt with in the text of the bulletin are the origin and history of barley; its botanical characters; its introduction into the United States; its soil, climatic, and moisture requirements; and directions for improving, producing, and storing the crop.

The author cites experimental data from sources already noted, and reports variety tests conducted at a number of points in the barley-growing area. The yields of the more productive varieties are stated in the following table:

Tests of barley varieties.

Variety.	Group.	Location of test.	Period.	Yield per acre.
				Bushels.
Manchuria (Minnesota No. 6)	Six-rowed	Williston, N. Dak	1908–1910	26.96
Common	do	do	do	26.00
Moravian	Two-rowed	do	do	23.30
Mansury	do	do	do	21.50
Swan Neck	do	Brookings, S. Dak	1905–1909	43.50
Hannchen	do	Highmore, S. Dak	do	38.90
Bohemian	do	do	do	33.00
Manchuria (Minnesota No. 6)	Six-rowed	do	do	28.30
Manchuria	do	Bellefourche, S. Dak	1908–9	21.70
Hanna	Two-rowed	do	do	26.40
Hulless [a]	Hulless	do	do	13.60
Caucasian	Six-rowed	McPherson, Kans	1906–1909	30.30
Black Smyrna	Two-rowed	do	do	23.90
Hanna	do	Philbrook, Mont	1909–10	32.15
Manchuria (Minnesota No. 105)	Six-rowed	do	do	27.50
White Hulless [a]	do	do	do	29.40
McEwan Hulless [a]	Two-rowed	do	do	21.30
California Feed	Six-rowed	Akron, Colo	1908–9	35.60
Hannchen	Two-rowed	do	do	34.80
California Prolific	Six-rowed	Nephi, Utah	1904–1910	19.86
Common California	do	do	do	19.69
Common	do	Modesto, Cal	1906–1909	26.70
White Smyrna	Two-rowed	do	do	24.54

[a] As the legal weight of hulless barley is 60 lbs. per bushel, and that of hulled barley only 48 lbs. per bushel, the yields in pounds of hulless barley in some cases in these tests were greater in case of certain hulled varieties although the number of bushels reported for the hulless varieties were smaller.

Bouloubа fiber, K. Braun (*Pflanzer, 7 (1911), No. 1, pp. 22–26*).—This article describes the plant *Gomphocarpus semilunatus* from which bouloubа fiber is derived, and discusses its distribution, methods of culture and harvesting, and uses. A chemical analysis of the fiber is also presented. It is believed that this fiber may be used as a substitute for flax fiber.

Variety tests with red clover, 1898–1910, E. LINDHARD (*Tidsskr. Landbr. Planteavl, 18* (*1911*), *No. 1, pp. 1–95*).—The author reports the results of a continuation of the study of varieties of red clover conducted at Danish experiment stations already noted (E. S. R., 16, p. 37).

Tests of over 400 samples of red clover of different origin were made at 6 experiment stations during 1898–1910. The types of clover of different countries are dealt with on the basis of the results obtained in these and earlier trials, covering in all variety tests with about 2,000 samples of red clover seed from different parts of the world.

The cultivated form of red clover, according to the author, has 2 main varieties, late and early red clover, which are often cultivated side by side within the same district of Denmark. The typical late red clover, as a rule, grows stems only once during the summer and gives therefore only one cutting. Early red clover grows stems several times the same summer and gives several cuttings. It blooms 10 to 20 days earlier than late red clover. The latter form is found in countries where the winter is most severe and the summer shortest, like Norway, most of Sweden, Finland, Northern Russia, and Siberia.

Most of the 4,400,000 lbs. of clover seed which Denmark imports annually is the early variety. The best seed of early red clover comes from Russia, Bohemia, and Holstein, in the author's opinion, while the late clover seed is imported from Sweden, Norway, Silesia, and Bohemia. The seed of the late clover grown in Denmark yielded considerably better than the imported seed. This form is especially adapted for cultivation with timothy and other late blooming grasses, or in pure stand. Under these conditions it gives, as a rule, larger hay crops and does better in cold and moist ground than the early red clover.

How to grow more and better corn, A. GOSS, A. T. WIANCKO, and J. B. ABBOTT (*Indiana Sta. Circ. 25, pp. 36, figs. 10*).—A discussion of the status of corn growing in Indiana and directions for the production of the crop accompany statements of the results of fertilizer and cropping system tests.

After 20 years' continuous cropping to corn the yield on the fertilized plats was 22.2 bu. less and on the unfertilized plats 35.1 bu. less than in 1889, the first year of the test. In cropping to corn and wheat the decreases during the same period were 2 and 24.6 bu. per acre, respectively, while in a corn, roots, oats, wheat, and clover and grass rotation increases of 15 and 2.7 bu. per acre occurred on the fertilized and unfertilized plats, as compared with the yields 20 years earlier. After (1) a corn, oats, wheat, and clover rotation, and (2) a corn, oats, wheat, and clover and grass rotation, the yields on the unfertilized plat had greatly decreased, and those on the fertilized plat had considerably increased.

The relation of live stock to soil fertility is discussed. The average gain secured from an average application of 4.5 tons of manure per acre on the last 2 crops in 5 different rotations was 17.1 bu. per acre. Tests in 5 representative counties resulted in an average gain of 6.6 bu. per acre at an average cost of $1.11 per acre for fertilizers or $1.39 return for every dollar invested in fertilizer. This amount was secured after the use of phosphorus and potassium and is much greater than that secured after the application of a complete fertilizer, or of (1) nitrogen and potassium, or (2) nitrogen and phosphorus. A table states also the calculated effect and value of each element by difference.

In Starke, Henry, Newton, and Madison counties the average yield secured on check plats was 36.4 bu. per acre as compared with 60.4 bu. after an application of 200 lbs. of muriate of potash, 61 bu. after an application of 200 lbs. of muriate of potash and 300 lbs. acid phosphate, and 61.4 bu. after an application of the last-named mixture and 100 lbs. of dried blood in addition. Separate papers deal with corn insects (by J. Troop) and corn smut (by A. G. Johnson).

Annual report of the Kalimpong Demonstration Farm for the year 1909–10, P. Goodwin (*Ann. Rpt. Kalimpong Demon. Farm [Bengal], 1909–10, pp. II+21, maps 2*).—In a variety test the locally grown maize produced yields about 7 times as great as those from Jaunpur maize On unterraced land corn produced about one and a half times and buckwheat about twice as great yields as were secured from terraced land. The difference is attributed to the newly exposed subsoils which constituted half of each terrace.

Cotton growing in the Cape Province, A. Van Rynevelo (*Agr. Jour. Union So. Africa, 1 (1911), No. 3, pp. 410–412*).—Four samples of Egyptian Abassi cotton all showed weakness of fiber, while the Mit Afifi sample examined was fairly strong. A full report for each sample is given as to weight, color, strength, diameter of fibers, and commercial valuation.

General report of the cotton commission, 1910 (*Rap. Gén. Com. Coton [Egypt], 1910, pp. 36, table 1, pls. 2*).—This report, presented to the Egyptian government, describes various factors entering into cotton culture, including irrigation, precipitation, soil, degeneration, impurity, and variation in the plant, crop rotations, fertilization, and the prevention of insect injury. Notes are also given on the agricultural organization, the experiment stations, and the work of special agricultural committees in Egypt.

Report of field trials on the manuring of mangels, 1907–1910, T. Milburn and R. C. Gaut (*County Council Lancaster, Ed. Com., Agr. Dept., Farmer's Bul. 19, 1911, table 1, pp. 8*).—In a 4-year test of 7 different applications of natural and artificial fertilizers on various farms, the highest average yield of mangels followed the use of a mixture of 15 tons of farmyard manure, 2 tons of nitrate of soda, 3 cwt. superphosphate, 3 cwt. kainit, and 1 cwt. salt. The nitrate of soda was applied "½ as 2 top-dressings" An almost equally high yield of mangels and a considerably higher profit followed the application of a mixture similar in every respect except that the salt and one-half the nitrate of soda were omitted.

As a result of fertilizer tests the author concludes (1) that increasing the application of farmyard manure from 15 to 25 tons did not materially increase the crop; (2) that incomplete artificial fertilization was less profitable than complete fertilization; (3) doubling the amount of nitrate of soda in a complete mixture greatly reduced the profit; and (4) the use of 1 cwt. of salt gave a good return.

Millets of the genus Setaria in the Bombay Presidency and Sind, G. A. Gammie (*Mem. Dept. Agr. India, Bot. Ser., 4 (1911), No. 1, pp. 8, pls. 5*).—Descriptions and illustrations are given of *Setaria glauca* and of *S. italica* and of 3 varieties of the latter.

Potato spraying experiments in 1910, F. G. Stewart, G. T. French, and F. A. Sirrine (*New York State Sta. Bul. 338, pp. 115–151, pl. 1, dgm. 1*).—This bulletin gives the results of the ninth year's work in the 10-year series of potato spraying experiments begun in 1902, together with a summary for the entire period. Earlier results have already been noted (E. S. R., 19, p. 447; 20, p. 1043; 23, p. 449.)

During 1910, 19 separate experiments were conducted along the same lines as in previous years. "At Geneva 6 sprayings increased the yield 63 bu. per acre and 3 sprayings increased it 22 bu. Flea beetles, early blight, late blight, and rot were all factors in the experiment. The benefit from spraying was scarcely noticeable until after September 2. At Riverhead the gain due to 5 sprayings was 19 bu. per acre and to 3 sprayings 8½ bu. The plants suffered from drought and were slightly injured by flea beetles, aphids, and early blight, but there was no late blight or rot.

"In 12 farmers' business experiments, including 218 acres, the average gain due to spraying was 19.1 bu. per acre; the average total expense of spraying, $4.04 per acre; and the average net profit, $4.39. In 3 of the experiments spraying was unprofitable."

Five volunteer experimenters averaged 68 bu. per acre in the gains reported. Early blight was not destructive and little injury to foliage resulted from a late outbreak of late blight, although it caused considerable loss from rot. Colorado beetles, flea beetles, and tip burn were the chief source of trouble to potato foliage in 1910.

Dry weather tests potato spraying, F. H. Hall (*New York State Sta. Bul. 338, popular ed., pp. 3–8*).—This is a popular edition of the above.

Better grain-sorghum crops, C. R. Ball (*U. S. Dept. Agr., Farmers' Bul. 448, pp. 36, figs. 13*).—This bulletin gives "the best known methods of improving the grain-sorghum crops on the farms where they are grown." It deals with the topography, soils, climate, and agricultural development of the grain-sorghum belt, the history, uses, and statistics of the crop, and the methods of improving it in drought resistance, earliness, dwarfness, and productiveness. Earlier papers on the same subject by this author have already been noted (E. S. R., 22, p. 729; 23, p. 140; 24, p. 734).

Transmission of the nitrogen content in the sugar beet, J. Urban (*Ztschr. Zuckerindus. Böhmen, 35 (1911), No. 8, pp. 443–450*).—The studies made by the author indicated that the nitrogen content of the sugar beet may be transmitted in a manner similar to the sugar content. The nitrogen content of the plants was not always in direct correlation with the sugar content. The author suggests that in improving the sugar beet by means of breeding, the nitrogen content as well as the sugar content should be taken into consideration, as this is a step in the direction of securing greater purity in the juice.

Wheat cultivation in tropical Africa (*Agr. Jour. Moçambique, 1 (1911), No. 1, pp. 9–13*).—A brief statement of the progress made in wheat cultivation in British East Africa is followed by a report of the results of commercial valuations and data as to the composition of samples of wheat grown in different parts of the world.

The results of chemical analyses are summarized in the following table:

Gluten and gliadin contents of wheat grown in various countries.

Variety.	Grown in—	Gluten.	Gliadin.
		Per cent.	*Per cent.*
Gluyas	British East Africa	12.6	7.5
Bob Rust-proof	do	12.2	7.4
Gluyas	East Africa Protectorate	11.7	6.9
Rietta	do	10.6	6.5
Durum	Uganda	12.04	5.53
Mixed hard and soft	Kano	11.3	5.9
	Zaria	10.7	6.3

Statistical investigations of structural variation in cereal plants, Quante (*Landw. Vers. Stat., 74 (1910), No. 1–2, pp. 121–162, fig. 1*).—The statistical method and its application is discussed and examples are given showing how different factors, such as length of spike, length of stem, weight of kernel, and others are treated. The author states that for the exact description of measurable factors in cereal plants the average as determined from a single series of individuals of this particular variety or strain is inadequate, but on account of the asymmetrical variations in individuals from the average values these variations as well as the average values should be taken into consideration in arriving at the most probable value of a certain factor. The author observed that when careful selection is practiced in plant breeding, symmetrical variations occur.

Report of the Danish seed control, 1909–10, K. Dorph-Petersen (*Tidsskr. Landbr. Planteavl, 17 (1910), No. 5, pp. 732–770*).—This thirty-ninth annual report of the seed-control station gives the usual summary data of results obtained in the work of the station during the year ended June 30, 1910. During the year 7,694 samples of seeds were examined.

The Lom seed drill and older forms of seeders, S. Hasund (*Tidsskr. Norske Landbr., 18 (1911), No. 2, pp. 69–88*).—The article describes an old seed drill originating in one of the interior mountain districts of Norway and used there until recently. Its history and possible relationship to early English seed drills are traced.

HORTICULTURE.

Report of the botanical department, B. D. Halsted et al. (*New Jersey Stas. Rpt. 1909, pp. 269–343, pls. 26*).—The plant-breeding studies of the department (E. S. R., 22, p. 140) were continued. The leading kinds of plants under observation were beans, sweet corn, eggplants, peas, peppers, squashes, and tomatoes. Crosses and hybrids among each of these vegetable fruits were studied and are here discussed.

In the work with beans, which is reported separately by E. J. Owen, especial attention was paid to the series of crosses between mottled and white limas. The hybrids between snap beans and the scarlet runner were further studied and a large number of attempts to hybridize the snap and lima species are under way.

Crosses between standard sorts of sweet corn and typical western field varieties were tested by a number of cooperators throughout the State and elsewhere. The results indicate that the added vigor of the field parent was the probable factor that saved these crosses from destruction through drought that came to the early, ordinary sweet sorts. The crop of sweet field corns was good and the quality of the grains excellent. The behavior of the sweet corn crosses when the color of the grains is different was also studied. A practically solid flinty ear of the Malamo variety grown upon poor soil in 1908 was planted where the soil approaches a garden condition with the general result that there was about an equal number of the flinty and the sweet grains in the whole lot of ears. In some instances the flintiness or its absence seemed to indicate a plant character, since in some ears the sweet grains are the rare exception and in others the flinty ones are scarce. The authors suggest that the drifting of the original sweet corn may have gone far enough toward a true flinty corn so that the starch-forming quality becomes a Mendelian factor when bred with those grains that are more sweet than flinty; that is, the flinty grains in an otherwise sweetish ear may be due to fertilization by pollen bearing the starch-forming power.

Crosses between the American kinds of eggplants were under observation. The general details of the work of developing an edible sort out of the hybrid between the American and Chinese species are given.

Owing to the death of N. D. Shore the work with peas, peppers, and squashes was interrupted and is only partially reported on. A noticeable result of fertilization within the plant among squashes was the feebleness of the vine followed by failure of the crop. The crosses are discussed relative to variations in shape, weight, color, and shell. The principal phases discussed in connection with the blend crosses of peppers are type of foliage and range of leaf forms, position of the fruits, seedless fruits, and secondary pistils in peppers.

Determinations of the number of seed cavities of several varieties of tomatoes show that this characteristic is fairly constant when the normal number of seed cavities is 2 or 3, as in the smaller sorts, such as Currant, Cherry, etc. It is quite variable on the other hand in the large, flat, and irregular kinds, such as Ponderosa. Crosses of the smaller and larger fruited sorts resulted in a great variety in number of seed cavities.

A number of hybrid forms were studied in the ornamental border. Of these the carnation-pink hybrids are particularly promising. A hybrid of *Hibiscus manihot* upon the okra (*H. esculentus*) was remarkable for its extreme vigor, large size, and strong blooming tendency, and may give promise as an ornamental annual.

The variations in the following wild plants are discussed and illustrated: Dandelion, shepherd's purse, mandrake, catmint, and the heads of the oxeye daisy. Observations of the velvet leaf (*Abutelon abutelon*) were made on the relation of position upon the plant to the number of seed vessels, from which it appears that the fruits situated upon the main stem or near it and consequently better nourished have the greatest number of seed vessels.

Meteorological data as to rainfall, temperature, and sunshine during the growing season for the past 21 years are included.

Report of the horticulturist, M. A. BLAKE and A. J. FARLEY (*New Jersey Stas. Rpt. 1909, pp. 79–99, pls. 4*).—This comprises a progress report on the peach investigations being conducted at High Bridge and Vineland and the greenhouse investigations with carnations and roses (E. S. R., 22, p. 141), together with some additional data on the long-continued fertilizer experiments with cherries, and brief descriptions of a number of newer varieties of strawberries tested during the year. Experiments in dipping peach trees to control the peach root aphis are noted on page 462 of this issue.

In connection with the peach investigations at Vineland, measurements are being made each spring of the amount of annual growth made by the trees. These data for the seasons of 1907 and 1908 are here tabulated. A striking difference in the amount of injury to the young trees by wind and rain was noted with the various varieties. Generally speaking the varieties of the Persian group type sustained severe injury to the more tender leaves, while varieties of the North China type were but slightly injured. The peach leaf curl caused much damage in private orchards in the vicinity of High Bridge during the spring of 1909. The trouble was effectively controlled in the station orchard, however, by a thorough spraying with lime-sulphur, when some Elberta trees left unsprayed as a check were quite seriously affected. The variety Mountain Rose was only very slightly affected, even when unsprayed. The failure of lime-sulphur to control the curl in a number of cases is attributed to imperfect preparation of the mixture or a lack of thoroughness in its application.

In the fertilizer experiments with cherries which were started in 1896, all the plats have received an annual application of equal parts of ground bone, muriate of potash, and acid phosphate at the rate of 500 lbs. to the acre and certain plats have received an additional annual dressing of 150 lbs. of nitrate of soda since 1900. The nitrate of soda plats have yielded a larger quantity of fruit, and it is believed that this increase will be more marked as the trees grow older and require more nitrogen.

Home vegetable gardening, F. F. Rockwell (*New York, 1911, pp. 262, pls. 63, figs. 4*).—This is presented as a complete and practical guide to the planting and care of all vegetables, fruits, and berries worth growing for home use.

Is the hull-content of peas a variety characteristic? H. Tedin (*Sveriges Utsädesför. Tidskr., 21 (1911), No. 2, pp. 72–77*).—The conclusion of Fruwirth[a] that small peas have higher percentages of hull-contents than large ones was corroborated by the author. This refers only to comparisons of plants of the same variety, however, and not to comparisons of different varieties with one another. An account is given of the author's investigations of the above question, including a summary in German.

Newer varieties of strawberries and cultural directions, O. M. Taylor (*New York State Sta. Bul. 336, pp. 45–77, pl. 1, figs. 3*).—In continuation of previous variety tests of strawberries (E. S. R., 20, p. 940) this bulletin contains a report on 50 varieties, many of them recent introductions, which fruited on the station grounds in the years 1909 and 1910. Suggestions are also given relative to the cultural treatment of strawberries. The data in the variety descriptions include the source of the plants tested, brief historical notes, characteristics of plant and fruit, and the apparent value as shown under the conditions at the station.

Owing to the late spring frosts it is impossible to grow early blooming varieties in some parts of the State. Three of the earliest blooming varieties described, however, Mascot, Parcell Early, and Superior, are considered of sufficient merit in other characters to be worthy of a test, even in the colder sections of the State. Of the 50 varieties tested, 38 were discarded. Among the 12 remaining varieties are Early Ozark and Battenburg, which were unusually productive, and Deacon, a brief flowering midseason variety of high quality, as well as Mascot and Parcell Early above mentioned.

Growing and testing strawberries, F. H. Hall (*New York State Sta. Bul. 336, popular ed., pp. 3–15, figs. 2*).—A popular edition of the above.

Statistical summary of the California raisin industry, 1873–1910, G. Robertson (*[1911], pp. 4*).—This is a statistical review of the raisin industry in California, which is supplementary to a paper read at the California State Fruit Growers' Convention, December, 1910.

Orchard heating in Indiana, W. M. Walton, Jr. (*Mo. Weather Rev., 39 (1911), No. 1, p. 29*).—The author briefly describes his results in the use of oil heaters during the spring of 1910. The results as a whole indicate that whereas orchard heaters may prove beneficial under normal conditions, they are of little value in the presence of continued high, northwest winds combined with freezing temperature.

Protecting trees from rabbits, J. C. Cunningham (*Kansas Sta. Circ. 17, pp. 4, figs. 4*).—The author here briefly discusses the protection of trees by trapping, poisoning, and the use of repellents. Directions are given for the construction and use of a barrel trap and for a box trap that is said to have been used with remarkable success. A spray made of buttermilk and common stove soot in the proportion of 1 gal. of the former to ½ lb. of the latter, boiled for a period of 20 minutes, is said to have proved quite satisfactory as a repellent.

Manufacture and storage of homemade solutions, J. E. Harris (*Michigan Sta. Tech. Bul. 6, pp. 9–15*).—For the purpose of gaining information relative to the manufacture and storage of homemade lime-sulphur solutions, studies were made of the effect of lime and of magnesia on the composition of the solution, together with the effect of storing the solution in contact with the sediment, and the effect of reheating the solution before using. The results, which are presented in tabular form and discussed, are summarized as follows:

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[a] Fühling's Landw. Ztg., 47 (1898), No. 12, pp. 443–448.

"If formula 50:100:50 or 60:125:60 or any other formula providing for an excess of sulphur is to be used, the lower the amount of magnesia in the lime used, the greater the amount of sulphur to go into solution. If an analysis of the lime used is available, an amount of lime should be used so that there shall be twice as much sulphur as calcium oxid. It is only in this way that a maximum amount of sulphur can be made to dissolve. There is no particular advantage to be gained by filtering the lime-sulphur solutions before storing. While there is a slightly greater dropping off in the total sulphur in the unfiltered solution than in the filtered, there is a smaller decrease in the sulphid sulphur in the unfiltered than in the filtered, provided an excess of sulphur has been used in the manufacture of the solution. In those solutions, in the manufacture of which an excess of sulphur has been used, only a very slight increase in the amount of total sulphur in solution is observed when the solution is reheated before using. This increase is not sufficient to pay for the cost of such an operation."

Manufacture and storage of lime-sulphur spray, A. J. PATTEN (*Michigan Sta. Circ. 10, pp. 69–77*).—A popular presentation of the above.

Spraying apples, A. DICKENS and T. J. HEADLEE (*Kansas Sta. Circ. 15, pp. 8*).—This circular points out the value of proper spraying and the methods of conducting it. A more complete account is contained in Bulletin 174, previously noted (E. S. R., 25, p. 137).

Practical studies of the evaporation of fruits, E. RABATÉ (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), Nos. 17, pp. 519–527; 19, pp. 585–596; 23, pp. 720–726, figs. 23*).—A number of fruit evaporators of different types and using different kinds of fuel were tested at Villeneuve-sur-Lot, France, in 1910. The present study discusses the construction of the evaporators, describes the principal types, and gives data on the results secured with each kind.

The economic climatology of the coffee district of Sao Paulo, Brazil, R. DE C. WARD (*Bul. Amer. Geogr. Soc., 43 (1911), No. 6, pp. 428–445, map 1*).—This paper deals with certain climatic aspects of coffee cultivation and of its preparation for market which presented themselves during a summer trip to Brazil undertaken in connection with a study of the economic climatology of the Brazilian coffee district.

Carnations, picotees, and pinks, T. W. SANDERS (*London [1910], pp. 196, pls. 17, figs. 44*).—A practical guide to the cultivation and propagation of border, perpetual, and other carnations, picotees, garden and alpine pinks, Sweet Williams, etc., including lists of varieties and a description of the various pests and diseases thereof.

Garden art, M. FOUQUIER (*De l'Art des Jardins. Paris, 1911, pp. X+254, pls. 47, figs. 331*).—This consists of a pictorial and historical account of the evolution of garden art in France, in which the author has aimed to present by way of a monument to the national garden art as complete a series as possible of old sketches and of more recent views taken during the period from the fifteenth to the twentieth centuries. Although the various periods are touched upon in the historical text, special emphasis is placed upon that period at the end of the Renaissance, when the French style became separated from the Italian conception. In addition to the general historical account the garden decorations of the various periods are discussed, together with the renovation of French gardens during the nineteenth and twentieth centuries.

Some notable gardens of other European countries are also pictured and discussed.

The landscape gardening book, Grace Tabor (*New York, 1911, pp. [illegible], pls. 63, figs. 13*).—In this popular work the avowed aim is to set down the simple laws of beauty and utility which should guide in the development of all grounds.

The successive chapters discuss utilizing natural features, the style of a garden, getting into a place, vines as harmonizers, vistas good and bad, boundaries, entrances and gateways, deciduous trees, evergreen trees, the use of shrubs, the place of flowers, winter and the garden, the vegetable garden beautiful, garden structures, garden furniture and accessories, and planting and general care.

Town planting and the trees, shrubs, herbaceous and other plants that are best adapted for resisting smoke, A. D. Webster (*London and New York, [1910], pp. 211, pls. 16*).—The cultural directions, together with lists of plants, given in this book are based upon the author's experience in caring for the grounds of many public buildings in several of the worst smoke-infested parts of London.

FORESTRY.

Schlich's manual of forestry.—III, Forest management, W. Schlich (*London, 1911, vol. 3, 4. ed. rev., pp. X+403, figs. 59*).—A treatise on forest management which is divided into the following general parts: Forest mensuration, forest valuation, the foundations of forest management, and preparation of forest working plans.

The successive chapters in part 1 discuss instruments used in forest mensuration, measurement of felled and standing trees, determination of the volume of whole woods, the age of trees and woods, and determination of the increment. Part 2 discusses matters preliminary to forest valuation, valuation of forest soil, of the growing stock, and of the whole woods or forests, determination of the rental of forests, and the financial results of forestry. Part 3 treats in detail of the increment, the rotation, the normal age classes, the normal growing stock, the normal yield, and relations between increment, growing stock, and yield. The discussion on the preparation of forest working plans in part 4 takes up the collection of statistics, division and allotment of the forest area, determination of the method of treatment, determination and regulation of yield, control of execution, and renewal of working plans.

Several appendixes are given containing tables and data of use in forest management.

New view points in silviculture, R. Zon (*Forestry Quart., 9 (1911), No. 2, pp. 205–218*).—A review of H. Mayr's last book on silviculture (E. S. R., 20, p. 943) with special reference to the discussion of climatic factors determining the existence of forest regions. On the basis of the average temperature, air humidity, and precipitation during the vegetative period, as well as on the basis of the annual temperature, the dates of occurrence of the first and last frost, and the absolute minimum temperature, Mayr established several forest regions or zones for Europe, America, and Asia, each zone being characterized by tree species having about the same climatic requirements. The different zones are here arranged in tabular form for ready comparison.

Forestry and the lumber business, J. E. Rhodes (*Forestry Quart., 9 (1911), No. 2, pp. 195–204*).—The author points out the direction which the development of forestry in this country should take to be of assistance to the lumber business as a whole.

The importance of the seed source question for the breeding of healthy plants in forestry, Herrmann (*Vorträge Pflanzenschutz, Abt. Pflanzenkrank. Kaiser Wilhelms Inst. Landw. Bromberg, 1911, No. 2, pp. 1–22, fig. 1*).—A study of the results of various European tests of forest seed from different countries in which the author points out that diseased conditions among forest stands may often be attributed to the use of seed procured from a climate and under conditions dissimilar to the climate and conditions where the stand is to be established.

Comparative soil moisture determinations in the litter experimental areas of the pine forests in Wiener-Neustadt, R. WALLENBÖCK (*Centbl. Gesam. Forstw., 37 (1911), No. 5, pp. 197–209*).—In connection with the litter experiments which have been conducted in pine forests for a number of years under the direction of the Mariabrunn Forestry Station, Böhmerle found that a moss cover as compared with annual raking was unfavorable for regeneration by seeding (E. S. R., 20, p. 945) and also appeared to retard the growth of the trees during a dry season (E. S. R., 24, p. 445). Following up these investigations the author conducted soil moisture determinations of the experimental areas in the years 1909 and 1910. The results are presented in detail.

The most important variation between the water behavior in the moss-covered soil and in the annually raked soil was the more rapid drying out but at the same time quicker restoration of water in the raked area. In a dry year the raked area can take up water from the light summer rains, whereas the moss-covered area conserves the water for a short time only and prevents the light showers from reaching the underlying soil.

In connection with the results secured by Böhmerle, the author concludes that the harm done by a moss cover during dry years is far greater than the benefit derived through the greater amount of water stored in wet years.

The white pines of Montana and Idaho: Their distribution, quality, and uses, F. I. ROCKWELL (*Forestry Quart., 9 (1911), No. 2, pp. 219–231*).—A general discussion.

Memorandum on teak plantations in Burma, F. A. LEETE (*[Indian] Forest Bul. [n. ser.], 1911, No. 2, pp. 21, dgms. 4*).—This memorandum summarizes all the data that were available up to 1909 relative to the growing stock in teak plantations in Burma. The conclusions arrived at are embodied in the form of a series of curves, and a tabular summary illustrates the relation between age, girth, number of stems and height for fully stocked plantations in which thinnings are started as soon as required and are repeated every 10 years.

Note on the relative strength of natural and plantation-grown teak in Burma, R. S. PEARSON (*[Indian] Forest Bul. [n. ser.], 1911, No. 3, pp. 9, pl. 1*).—Pieces of both kinds of teak of similar dimensions and containing approximately an equal amount of moisture were selected, both sets of tests being carried out with the same machine.

The results obtained for both classes of timber were very similar, and it is concluded that in as far as the wood tested is concerned, there is little difference in the strength of natural and plantation-grown teak. Although in the test for the coefficient of transverse strain the natural-grown wood has proved superior in strength to the artificial product, the strength of the latter is sufficiently high.

The culture of Hevea in the Malay Peninsula, P. J. S. CRAMER (*Proc. Agr. Soc. Trinidad and Tobago, 11 (1911), No. 1, pp. XV+130, pls. 25, figs. 24*).—This is an English translation of Bulletin 25 of the Suriname Department of Agriculture (E. S. R., 24, p. 43).

Silvicultural treatment of abandoned pastures in southern New England, P. T. COOLIDGE (*Forestry Quart., 9 (1911), No. 2, pp. 235–261, pls. 2*).—Suggestions are given relative to the silvical treatment of various types of brush on old pastures.

Report on timber conditions, etc., along the proposed route of the Hudson Bay Railway, J. R. DICKSON (*Dept. Int. Canada, Forestry Branch Bul. 17, 1911, pp. 27, pl. 1, figs. 5*).—This embraces the results of an inspection made under the direction of the Forestry Branch of the Canadian Department of the Interior. It describes the district covered and gives the details of location and quantities of timber.

Rocky Mountains Forest Reserve—Report of boundary survey parties, G. H. EDGECOMB and P. Z. CAVERHILL (*Dept. Int. Canada, Forestry Branch Bul. 18, 1911, pp. 27, pl. 1, figs. 14*).—This consists of reports of forest surveys conducted on the eastern slope of the Rocky Mountains in 1910 for the purpose of determining the line of the eastern boundary of the Rocky Mountains Forest Reserve.

A self-registering caliper for measuring trees, WILD (*Forstw. Centbl. n. ser., 33 (1911), No. 6, pp. 305–308, figs. 2*).—A self-registering caliper, which is said to have been used successfully in measuring a number of species of trees, is here illustrated and described.

Multiple volume table, L. CROWELL (*Forestry Quart., 9 (1911), No. 2, p. 262*).—A form is given for a multiple volume table to be used as an aid in computing the total volume of any area in which the trees are tallied by diameters and height classes. The multiple table is compiled from a volume table of the species estimated.

Wood utilization in 1909 (*Bol. Min. Agr., Indus. e Com. [Rome], 9 (1910), Ser. A, No. 20, pp. 873–881*).—This consists of a statistical summary for the various Provinces and districts of Italy relative to the quantity and value of construction and industrial woods, firewood, and charcoal wood used from the state and private forests in 1909.

Seasoning wood by electricity, A. HALSTEAD (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 149, p. 1373*).—This consists of a brief description credited to a British technical paper concerning a new process of seasoning wood by electricity in France.

"A large tank is filled with a solution containing 10 per cent of borax and 5 per cent of resin, with just a trace of carbonate of soda. In the bottom of the tank is a lead plate which is electrically connected to the positive pole of the dynamo. The timber to be treated is stacked on this plate, and when the tank has been filled another plate is superimposed and connected to the negative pole of the dynamo. When the current is switched on it passes through the stack of wood between the 2 plates and in its passage it is said to drive out the sap in the timber and deposit borax and resin in its place, completely filling up all pores and interstices. When the process is completed the timber is removed and dried, after which it is ready for use. It is claimed that the timber submitted to this treatment, no matter how green it may be, becomes completely seasoned."

Forest products of Canada, 1909.—Tan bark and tanning extract used, H. R. MACMILLAN (*Dept. Int. Canada, Forestry Branch Bul. 20, 1911, pp. 6*).—This is a statistical review based upon information received from 67 tanneries and representing about 90 per cent of the vegetable tannin consumption in Canada. The total value of all the vegetable tanning materials used by Canadian tanneries in 1909 was $1,126,004.

DISEASES OF PLANTS.

Report of plant pathologist, H. S. FAWCETT (*Florida Sta. Rpt. 1910, pp. XLV–LXV, figs. 14*).—The work of the year consisted mainly of investigations of the diseases of citrus trees, including stem-end rot, gummosis, scaly bark, scab, silver scurf, and buckskin. Studies were also made of the red rot of sugar cane (*Colletotrichum falcatum*), of the spore stages of the brown fungus of the whitefly, which is described as new under the name of *Ægerita webberi* (E. S. R., 23, pp. 655, 758), and of a species of scaly fungus from Lecanium on *Pinus tæda*.

The stem-end rot is a disease only recently observed on nearly all varieties of citrus fruits in Florida, but is now reported from 20 localities with its focus of infection in Volusia, Lake, and Orange counties. It has caused damage ranging from 5 to 30 per cent of the fruit in infected groves. The fruit first softens and becomes slightly depressed around the stem end without any change in the color of the rind. The rot proceeds inward along the fibers of the rag, and then outward into the pulp cells. At first there is no discoloration of the rind and pulp, but as the softening continues the rind turns a dull brown and the rag and pulp cells disintegrate, causing the entire fruit to become soft and mushy. The rot usually occurs on full-sized ripening fruit after it has dropped or has been picked, but may begin while the fruit is still on the tree. It also develops on fruit which is apparently perfectly sound when packed. Pure cultures have been isolated from the interior of diseased grapefruit, sweet and sour oranges, and from tangerines. Inoculation tests with pure cultures and with pieces of diseased tissue produced typical stem-end rot in the sound fruit, mainly of oranges, after an incubation period of about 2 weeks. These inoculation experiments showed that under laboratory conditions the infection of sound oranges may occur not only through the cut ends of stems up to 3 in. long, but also through the epidermis of the fruit and through the calyx, and that infection of oranges and lemons may occur in water either from cultures, pieces of diseased orange tissue, or infected soil.

A description of gummosis and distinctions between it, scaly bark, and foot rot are given, and the following methods of treatment are suggested: Either scrape off the diseased bark and paint the surface with a carbolineum mixture consisting of 1 gal. of carbolineum and 1 gal. of water in which 1 lb. of whale-oil soap has been dissolved, or peel off the bark over the diseased area without injuring the underlying wood and cover the wound with a grafting wax consisting of 6 oz. of alcohol, 1 lb. of resin, 2 oz. of tallow, and 1 oz. of spirits of turpentine

A further test of the methods of controlling scaly bark, previously noted (E. S. R., 23, p. 446), showed that in the main the recommendations therein given still hold good, but certain modifications are suggested, the line of treatment depending upon the condition of the trees and of the grove as a whole. If the disease is of recent appearance in the locality and is confined to 2 or 3 trees in a grove, the infected trees should be cut back to the stump and treated as previously suggested. If the disease is of long standing in a grove in which the trees are still looking fairly well, a thorough pruning out and spraying with Bordeaux mixture will effectually check its growth. When the trees are badly diseased, showing much dead wood and weakened limbs covered with scaly bark spots and spongy bark, they must be headed back in December and January, cutting out all the foliage and small branches and leaving only the body and larger limbs; the entire surface should then be painted with the carbolineum solution.

An extended study of citrus scab or verrucosis has been made, the results of which will be published later. In the spraying experiments for controlling this scab it was found that trees sprayed with Bordeaux mixture in November and again the following March were entirely free from the disease. The use of a carbolineum emulsion even up to 25 per cent in strength was less effective than the Bordeaux mixture.

In studying silver scurf, sometimes called "thrip marks," the conclusion was reached that a species of fugus, probably a Coniothecium, is one of the main factors in producing the disease.

The characteristics of the red rot disease of sugar cane as it exists in Florida and methods for its control are given. The use of only healthy seed canes, dipping the seed canes in a 5:5:50 Bordeaux mixture just before planting, fall planting of the canes in place of bedding them, the burning of all trash in the old bed and of all diseased canes, and the gradual introduction of immune seedling varieties are suggested as remedies for combating this disease.

Infectious diseases of plants, F. Tidswell (*Rpt. Govt. Bur. Microbiol. N. S. Wales, 1909, pp. 54–72, figs. 21, map 1*).—This report includes a list of fungus diseases met with during the year, arranged according to hosts and prepared by H. Johnston, discussions of potato blight and other potato diseases, and experimental researches on bunt of wheat, maize smut, and a disease of banana trees.

The potato diseases given for New South Wales are as follows: Late blight, leaf spot (*Alternaria solani*), dry rot (*Fusarium solani*), scab (*Oospora scabies*), a nematode (*Tylenchus devastatrix*), and brown fleck. Brown fleck is a disease which is characterized by the occurrence of rusty brown areas of various sizes and shapes in the flesh of cut tubers. These spots may be one to several in each tuber, either separate or confluent into a large area, involving almost the whole tuber, and consisting of dead tissues. No parasite has yet been found associated with it, and the cause of the disease is unknown.

The report on maize smut prepared by H. Johnston and that on bunt of wheat prepared by Darnell-Smith have been previously noted from other sources (E. S. R., 22, p. 745; 24, p. 347).

The report on diseases of banana plants prepared by the author and H. Johnston includes a description of a banana disease in which the leaves turn a golden yellow, followed eventually by the breaking off near the ground of all the stalks and suckers, and gives the results of a microbiological examination of the fluid and tissues from the diseased parts. The specimen examined, consisting of the stock of a well-grown tree, showed an external irregular patch of several square inches which was discolored and softer to the touch than the surrounding tissue. On pressure a fluid exuded through fissures. Transverse and longitudinal sections of the stock gave off a foul odor and showed sodden tissues and much free liquid which existed between the leaf sheaths as well as the actual tissue. Sections of individual leaves showed discolored areas of gray, green, and light and dark brown, while the core of the plant was soft and in parts diffluent, its ordinary fibrous character being replaced by a paste-like substance.

The disease apparently proceeds from below upward. A microscopical examination of the fluid and of diseased tissues revealed the presence of the larvæ of 2 flies (*Neœxareta spinigera* and a Phorid), one species of mites (Dermanyssus), nematodes (Monnochus and Diplogaster), a Fusarium, and 5 species of bacteria, 2 of which were putrefactive bacteria, one a chromogenic bacillus, one a saprophytic bacillus, and one bacillus which in its growth discolored and destroyed banana tissues on which it was grown.

Protection against plant diseases in Ireland (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 3, pp. 457–461*).—A brief history is given of the legislation on the regulation or prohibition of dangerous insect and fungus pests of economic plants, including a summary of the more important acts and orders and the methods of administering them.

Contribution to the study of the sooty molds, G. Arnaud (*Ann. École Nat. Agr. Montpellier, n. ser., 10 (1911), Nos. 3, pp. 211–254, figs. 9; 4, pp. 255–330,* *figs. 20*).—This is a more extended treatment of these fungi than the author's previous papers on this subject (E. S. R., 24, p. 742), and includes studies on the polymorphism of the various species, the systematic value of the biological conditions, and the taxonomic classification of the genera and species.

The author describes as new 2 genera, Pleocouturea and Fumagospora, 4 subgenera, viz, Pleomorfea, Teichosporina, Morfea, and Leptocapnodium, and 6 new species as follows: *Pleosphæria ilicis* on the leaves of *Quercus ilex*, *Teichospora capnodioides* on the dead bark of *Populis alba*, *T. salicis* on the branches of *Salix cinerea*, *Limacinia spongiosa* on the branches of *Nerium oleander*, *Pleocouturea castagnei* on the branches and foliage of *Pyrus malus* and *Eriobotrya japonica*, and *Fumagospora capnodioides* on the leaves and foliage of various plants.

South African cereal rusts, with observations on the problem of breeding rust-resistant wheats, I. B. P. Evans (*Jour. Agr. Sci., 4* (*1911*), *No. 1, pp. 95–104, dgm. 1*).—Observations extending over 4 years but confined chiefly to the wheat-growing districts of the Transvaal, inoculation experiments with *Puccinia graminis*, and experiments on breeding rust-resistant wheats, are reported.

The following grain rusts were listed for South Africa: *P. graminis* on wheat, barley, oats, rye, *Dactylis glomerata*, *Lolium temulentum*, and *Festuca elatior*; *P. triticina* on wheat; *P. coronifera* on oats; and *P. dispersa* on rye.

The black rust (*P. graminis*) is the most serious, usually being present on all summer cereals, and in the low country the uredospore stage is often found throughout the entire year. It is stated that this rust thrives best and does the most damage during hot and dry spells, when it becomes so abundant that the soil beneath the plants is colored a rusty brown with uredospores. The rust first appears on wheat, and then on barley, oats, and rye in succession. No æcidial stage of this rust was found in South Africa, and all attempts to germinate the teleutospores have failed. The author distinguishes 3 forms of *P. graminis* on cereals in South Africa, as follows: (1) A form on rye which never appears until late in the season after the plants are headed, and has only been found on the stalk but never on the leaves; this rust infects barley but not wheat or oats, and all attempts to infect the rye leaves with it have failed. (2) A form on wheat which infects wheat and barley, but not rye or oats; in the field during winter months the barley remains free from this rust, while adjacent wheat is badly rusted, but later during the summer the barley becomes highly susceptible. (3) The form on oats which does not infect wheat or barley. In India rust is unknown on oats, but the author states that the Indian oats grown in South Africa are highly susceptible to both *P. graminis* and *P. coronifera*.

In the rust-resistant breeding experiments in which Bobs Rust Proof and White Egyptian were used as immune and Wol Koren and Holstrooi as susceptible varieties, it was found that rust (*P. graminis*) from the hybrid is not only able to infect the immune parent but produces a severer infection on the susceptible parent than the rust from the parent itself. In other words, the pathogenic properties of the rust seem to have become distinctly increased after its sojourn in the hybrid plant and it produces a far more severe infection than rust from the susceptible parent. These hybrid plants, therefore, may play a very important part in the transmission of rust organisms from susceptible to immune varieties. The rust in the hybrid also developed a profusion of teleutospores, while on both parent wheats teleutospores were very sparingly produced, if at all.

The control of the loose smut of barley and wheat, O. Appel and E. Riehm (*Min. Bl. K. Preuss. Verwalt. Landw., Domänen u. Forsten, 7* (*1911*), *No. 5, pp.*

118–122, figs. 2).—After a brief discussion of the method of infection by the loose smut of these 2 cereals, the authors describe the various recognized methods of seed treatment for combating loose smut, including a discussion of the necessary apparatus and methods of procedure for disinfecting both small and large quantities of grain by either the hot-water or hot-air treatment.

Field experiments with wheat diseases, 1910–11, J. T. PRIDHAM (*Jour. Dept. Agr. Victoria, 9* (*1911*), *No. 4, pp. 250–256*).—Attention is called to the general prevalence and serious damage done to wheat crops every year by "take-all" (E. S. R., 25, p. 44) and also to the occurrence of this or a very similar disease on oats and barley.

The treatment of seed grain with formalin is claimed to have improved the germinating power as well as to have destroyed all external fungus spores. Tables are given showing the prevalence of "take-all" and the results of seed treatment with formalin, copper sulphate, and copper sulphate plus a 2 per cent salt solution.

Investigations on potato disease (second report), G. H. PETHYBRIDGE (*Dept. Agr. and Tech. Instr. Ireland Jour., 11* (*1911*), *No. 3, pp. 417–449, pls. 10*).—This is a report on work conducted during 1910 at the temporary station for the study of plant diseases at Clifden, Ireland (E. S. R., 22, p. 746). It includes further studies on the life histories and means of controlling the late blight of the potato (*Phytophthora infestans*), yellowing or yellow blight, stalk or sclerotium disease (*Sclerotinia sclerotiorum*), Botrytis disease, black stalk rot (*Bacillus melanogenes*), Spongospora scab, Rhizoctonia scab (*Hypochnus solani*), and leaf-roll disease.

Experiments on the infection of potato plants by wind-blown ascospores of *S. sclerotiorum* showed that such infection was possible. The author holds that the attacking of the potato plants by this disease occurs chiefly from aerially borne spores and not from the soil.

Potato plants were also found attacked by a Botrytis which, the author claims, is distinct from the Sclerotinia disease. Observations and cultures failed to show any genetic connection between the 2 fungi, and further, the sclerotia differ morphologically and physiologically. The sclerotia of the *S. sclerotiorum* fungus produce ascophores, while the Botrytis sclerotia produce only tufts of conidia.

In a further study of the black stalk rot (see below) which is said to be caused by *B. melanogenes*, the author claims to have proved that this organism also rots turnips, swedes, carrots, and parsnips, but not mangels.

The leaf-roll disease as it appears in Ireland is caused, so it is claimed, by *Verticillium alboatrum*, the mycelium of which was often found in the brown vascular tracts of the plants, and also in the roots. Plants grown from diseased tubers were affected with leaf-roll disease.

A bacterial disease of the potato plant in Ireland and the organism causing it, G. H. PETHYBRIDGE and P. A. MURPHY (*Proc. Roy. Irish Acad., 29* (*1911*), *No. 1, Sect. B, pp. 1–37, pls. 3*).—This is a detailed study of the disease known as black stalk rot and the organism causing it, a preliminary account of which has been previously noted from another source (E. S. R., 24, p. 552).

The author describes similar diseases, the characters of this disease, the isolation of the causative organism, and its morphological and cultural characteristics, discusses its pathogenicity toward other plants, and compares the causative organism with allied species. The disease is characterized by a discoloration and drying up of the foliage, browning of the principal fibrovascular bundles of the stem, decay of the underground portions of the stalk, and rotting of the tubers. The causative organism is called *Bacillus melanogenes*.

It is claimed that the use of diseased seed tubers is mainly responsible for the spread of the disease, which not only causes losses to the growing crop but much heavier ones during storage.

A bibliography is appended.

Experiments on the spraying of potatoes in County Louth, A. W. Oldershaw (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 3, pp. 450–456*).—The results are given of experiments conducted during 1908 to 1910 on the efficacy of various Bordeaux mixtures in controlling the late blight of the potato.

Soda and lime Bordeaux mixture and Woburn Bordeaux paste were used in the experiments. The Woburn Bordeau paste proved to be inferior to both the soda and the lime Bordeaux mixture.

Experiments on the influence of fertilizers on the leaf-roll disease of the potato and on the yield of tubers, Ostersprn (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 18, pp. 222–224*).—In experiments with stable manure and commercial fertilizers the leaf-roll disease was found to be worse on the unfertilized plats. It was also very serious on plats which contained no potash, and to a less extent on the plats which contained no phosphoric acid, while on the plats fertilized with stable manure and with a complete fertilizer containing nitrate of soda, potash, and phosphoric acid the outbreak of the disease was checked. The yield was found to be increased materially on all the fertilized plats as compared to the check plats.

Sooty mold of tobacco, E. Inglese (*Bol. Tec. Coltiv. Tabacchi [Scafati], 10 (1911), No. 2, pp. 81–89*).—The author describes the characters of this mold (*Fumago vagans*), gives the conditions under which it is usually found on the tobacco and the damage done by it, and suggests remedies for combating it.

It is claimed that the overrunning of the green parts of the tobacco plants by this fungus diminishes the absorbing and transforming power of the plant, thereby seriously affecting its photosynthesis and producing serious nutrition disturbances. The use of nitrate of soda to increase the vigor of the plant and spraying with tobacco decoctions to kill the aphids are the remedies suggested.

The value of spraying fruit trees (*Queensland Agr. Jour., 26 (1911), No. 5, pp. 266, 267*).—Attention is called to a statement in the monthly report for March on the fruit industry in the Stanthorpe district by J. Henderson, inspector under the Diseases in Plants Act, of the very favorable results obtained in controlling the American blight on badly infected apple trees, by spraying the trees several times during the winter months with a solution of red oil, followed, after the foliage appeared, by a weak kerosene oil emulsion wash applied with a brush to the cankers on the trunks and limbs missed by the red oil spray. The trees were almost entirely freed from the disease with this treatment and the wounds caused by the blight have healed up, leaving the trees in a fine, healthy condition.

Plum trees killed by Eutypella prunastri (*Gard. Chron., 3. ser., 49 (1911), No. 1274, p. 329*).—Attention is called to the frequent killing of young plum trees by this fungus in Cambridgeshire. The fungus girdles the bark of the main stem, thus killing it. Older plum trees and apple trees are not killed by the disease.

Spraying experiments with peaches, M. A. Blake and A. J. Farley (*New Jersey Stas. Bul. 236, pp. 3–30, pls. 12*).—The results of observations and tests conducted at Vineland during the season of 1910 with soluble sulphur solutions are given, together with directions for the preparation and application of self-boiled lime-sulphur mixtures for the control of peach scab.

The mixtures used in these tests were commercial lime-sulphur (1:100, 1:125, and 1:175), home-boiled lime-sulphur (1:80, 1:100, and 1:125, specific gravity

1.21), self-boiled lime-sulphur (8:8:50), atomic sulphur (9:35), Pyrox (1:20), and Sulfocide (1:400). Detailed results are given of the effects on the foliage of the various mixtures used, the effect of 1 early application of diluted concentrated lime-sulphur upon peach scab, the effect of early and late applications of self-boiled lime-sulphur, the effect of an early spraying with a soluble lime-sulphur followed by a second application of a soluble or self-boiled lime-sulphur, the effect of an early application of self-boiled lime-sulphur followed by an application of a diluted lime-sulphur and a self-boiled lime-sulphur, the effect of spraying young trees, and the effect upon brown rot of spraying to control peach scab.

As a result of these experiments it is claimed that it is unsafe to apply commercial concentrated lime-sulphur mixtures to peach foliage unless more dilute than 1:125, and some brands even burn the foliage when applied at this strength. Commercial lime-sulphur mixtures when diluted 1:150 or 1:175 do not injure the peach foliage, but have little effect upon peach scab. The atomic sulphur (a finely divided sulphur containing arsenate of lead) gave promising results against peach scab. It is held that the key to the control of peach scab is having a finely divided sulphur well distributed upon the leaves and fruit during a certain period. The authors, therefore, recommend that for the control of peach scab and brown rot 3 applications of the self-boiled lime-sulphur mixture be made, the first application just before the calyx is shed, and the other 2 at intervals of about 3 weeks.

A gum-inducing Diplodia of peach and orange, H. S. FAWCETT and O. F. BURGER (*Mycologia, 3 (1911), No. 3, pp. 151–153*).—A preliminary report is made on the isolation of a species of Diplodia from both peach and orange trees in Florida and of successful inoculations with pure mycelial cultures of the fungus which produced a copious gumming on healthy individuals of these 2 hosts.

The fungus was isolated from the interior of gummy peach branches obtained in 5 different counties in Florida, and also from gummy orange branches and decaying orange fruits. Ten series of experiments, including direct and cross inoculations on both hosts and covering a period of 5 months, were made by introducing pure mycelial cultures into cuts in the bark of 2-year-old peach trees and 1 to 3 year-old orange trees grown in pots in the greenhouse. Every peach tree thus inoculated developed gumming in from 4 to 7 days, and in one instance a deadened area was produced on the bark from which in 16 days after inoculation the pycnidia of the Diplodia developed. When bits of mycelium were placed in contact with uninjured bark of tender and green twigs, gumming was induced. In most instances the inoculations on the orange trees produced gum flow, while the cross inoculations from peach to orange and from orange to peach were successful in every instance.

The same fungus was also isolated from the rotting fruits of orange and grape-fruit, and was shown by inoculation experiments to produce a softness and decay of oranges, lemons, and apples. Portions of the fungus placed on the stalk end of plucked lemons and oranges produced decay, and the fungus was subsequently isolated from the interior of these fruits.

The microscopic morphology of the fungus agrees quite well with that of *D. natalensis*, which causes a decay in lemons and other citrus fruits in the Transvaal (E. S. R., 24, p. 157).

Report of assistant plant physiologist, B. F. FLOYD (*Florida Sta. Rpt. 1910, pp. LXVI–LXXVIII, figs. 4*).—The work during the year has been a continuation of previous investigations on the abnormal tissues of citrus trees affected with die-back, melanose, yellow spotting, and frenching (E. S. R., 23, p. 447).

Experiments with different fertilizers, especially nitrogenous, on the spotting of citrus leaves and the subsequent leaf fall showed that this spotting was probably due to nutrition disturbances initiated by the use of nitrate fertilizers, but could be counteracted by the addition of a phosphatic fertilizer.

Experiments on the use of copper sulphate as a treatment for die-back, in which 4 gr. of the copper salt in powdered form was inserted beneath the bark of diseased trees, showed after a lapse of about 21 months no beneficial results in controlling the disease. All untreated trees and 35 out of 46 diseased treated trees showed some symptoms of die-back at the close of the treatment. However, all the trees, both treated and untreated, showed a decided improvement in their general appearance and the die-back symptoms on both sets were much fewer than at the beginning of the experiments.

New fungicides for combating the mildew, V. VERMOREL and E. DANTONY (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 22, pp. 679–687*).—The authors give formulas, methods of preparation, and properties of several new copper sprays, including a modified soda-Bordeaux mixture (E. S. R., 25, p. 354), a copper sulphate-soap mixture, a colloidal copper sulphate-soap spray (see page 459), and their new silver nitrate spray (E. S. R., 24, p. 51). The qualities of various soaps which may be used in making copper-soap sprays are also discussed.

Note on the cellulose content of oak wood, which had been changed by Thelephora perdix, HELBIG (*Naturw. Ztschr. Forst u. Landw., 9 (1911), No. 5, pp. 246–250*).—Tests for cellulose were made with the so-called sound wood, of the grayish yellow wood in the neighborhood of the cavities, and of the white lining of the cavities in the wood. The "sound" wood showed 47.18 per cent of cellulose, the grayish yellow wood 66.37 per cent, and the white wood 68.66 per cent, on the basis of the air-dried substance.

These results show that only a partial change into cellulose of the tissues surrounding the cavities occurred, and that more cellulose is found in the immediate lining tissues of the cavities than elsewhere in the diseased wood.

Notes on some species of Gymnosporangium in Colorado, E. BETHEL (*Mycologia, 3 (1911), No. 3, pp. 156–160, pl. 1, fig. 1*).—The author figures and describes a new species of Gymnosporangium (*G. kernianum*) which produces witches' brooms from 2 in. to 2 ft. in diameter on the Utah cedar (*Juniperus utahensis*).

From field observations, the distribution, and the apparent roestelial characters of *Æcidium gracilens*, the author believes that it is probably the æcidial stage of *G. speciosum*.

The blister rust of white pine, P. SPAULDING (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 206, pp. 88, pls. 2, figs. 5*).—This bulletin gives an account of the European blister rust (*Cronartium ribicola*) of white and other five-needle pines and includes a historical account of the fungus, its distribution throughout the world, its economic importance, hosts, life cycle, nomenclature, description, field characteristics of the blight on *Pinus strobus*, the source of diseased stock found in America, the blister rust situation in America, methods of combating it, possible effects of new hosts and climate upon the virulence of fungus plant diseases in general, practical suggestions, present system of handling importations, and legislation against plant diseases.

The disease is claimed to be an exceedingly dangerous one and has caused immense damage to white pine in all European countries wherever it has obtained a good foothold. It has been found in Norway, Sweden, Finland, Russia, Siberia, Japan, Austria-Hungary, Italy, Switzerland, Germany, Denmark, France, Belgium, Holland, Scotland, and England, and has been introduced into Kansas, New York, Vermont, New Hampshire, Massachusetts, Connecticut, Pennsylvania, Indiana, and Ohio, and may be present in Minnesota and Ontario. It is known to have been shipped to 230 different localities in North America, but at the present time all known diseased stock has been destroyed.

The greatest damage done by the disease is in nurseries, where entire beds and even the entire stock have been rendered unsalable. The following methods of combating the disease are suggested: Import no five-leaf pine and Ribes stock, carefully inspect any imported Ribes stock during the first season and preferably during the second season also, keep five-leaf pines well separated from Ribes stock if either is imported—at least 500 ft. apart—remove and burn all diseased pine trees, inspect all pine stock from the last of April to June 10 and Ribes stock from July 1 until late in the fall, and inspect diseased lots of pines the second spring.

A very extensive bibliography of some 250 titles is appended.

The bladder rust of Scots pine, G. H. Pethybridge (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1911), No. 3, pp. 500–502, pls. 2*).—The author discusses the gross characters of this fungus (*Peridermium pini corticola*), the extent and character of the damage done by it, and its probable alternative hosts.

It is stated that many 40-year-old Scots pine trees are being killed by this rust in Waterford County, Ireland. The alternate stages of the rust were claimed by Liro (E. S. R., 21, p. 321) to occur on certain species of the lousewort (*Pedicularis palustris* and *P. sceptrum carolinum*), and it is stated that the rust should now be known as *Cronartium peridermium pini*.

A new species of Alternaria, L. L. Harter (*Mycologia, 3 (1911), No. 3, pp. 154, 155*).—Attention is called to a leaf spot disease of *Forsythia suspensa*, an ornamental shrub growing on the grounds of the United States Department of Agriculture. Subcircular gray spots were developed irregularly over the leaf surface and were surrounded by dead leaf tissue.

The causative organism is claimed to be a new species of Alternaria, for which the name of *A. forsythiæ* is proposed. A technical description of the fungus is appended.

The fungicidal action of Bordeaux mixtures, B. T. P. Barker and C. T. Gimingham (*Jour. Agr. Sci., 4 (1911), No. 1, pp. 76–94*).—The authors discuss this under 3 heads, (1) the action of atmospheric agencies, (2) the action of the host plant, and (3) the action of the fungus, and they give the results of experiments on the action of the host and of the fungus on the spray.

It was found that when the epidermal cells of the host were entirely sound and unbroken, only an inappreciable amount of copper could be rendered soluble by the host. In regard to the action of the fungi in rendering soluble the copper present, it appeared that only very small quantities were thus made soluble throughout the entire Bordeaux mixture film on the leaf, but that when the spores or hyphæ of several species of fungi were brought into direct contact with the insoluble particles of the copper compounds death ensued, probably due to a slight solvent action of the fungus on the particles.

The authors, therefore, claim that the fungicidal effect of Bordeaux mixture is not due to the absorption of atmospheric carbon dioxid by the spray, but is caused by the spores or hyphæ of the fungus coming into direct contact with the insoluble particles of the copper compounds, thereby causing very minute quantities of the copper to become soluble, and thus causing the death of the adjacent spores.

The action of carbon dioxid on Bordeaux mixtures, C. T. Gimingham (*Jour. Agr. Sci., 4 (1911), No. 1, pp. 69–75*).—The results are given of experiments on the influence of carbon dioxid on the basic copper sulphates in rendering soluble the copper present in the mixtures.

The experiments consisted of blowing air for 20 and 45 minutes through a Bordeaux mixture containing pure copper sulphate, leaving the Bordeaux mixture exposed for 1 and 24 hours in open beakers with frequent stirring and shaking, and for the same time without any stirring, and of treating the Bordeaux mixture with carbon dioxid.

The conclusion reached in these experiments is that although an excess of carbon dioxid in the Bordeaux mixture renders soluble small quantities of the copper, yet it appears impossible to assign the fungicidal action of the Bordeaux mixture to copper sulphate liberated by atmospheric carbon dioxid alone.

A colloidal copper fungicide, V. Vermorel and E. Dantony (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 19, pp. 1263–1265*).—A description is given of a so-called colloidal copper-soap mixture. This is prepared by dissolving 500 gm. of copper sulphate in 50 liters of water and 2,000 gm. of soap, as rich as possible in oleate of soda and containing neither carbonate of soda nor alkaline hydrates in excess, in 50 liters of water, and then pouring the copper solution into the soap mixture. It is claimed that the resulting mixture will be an opaque blue-green liquid which wets the plants (grapes) as easily as alcohol and has marked fungicidal properties.

New lime-sulphur strainer, J. P. Stewart (*Rural New Yorker, 70 (1911), No. 4088, p. 276, fig. 1*).—The author figures and describes a strainer in which the liquid is strained upward instead of downward, thereby preventing the deposit of sediment on the screen, which is of common occurrence with the old types of strainers.

The strainer consists of a box with a vertical partition extending throughout the middle and down about half way, dividing the box into a shallow and a deep compartment. Across the bottom of the shallow portion is placed a 30 to 50 mesh screen of iron or brass. On pouring the spray material into the deep compartment it rises and passes through the strainer into the shallow compartment where it may be drawn off by a faucet as needed.

ENTOMOLOGY.

Report of the entomologist, J. B. Smith (*New Jersey Stas. Rpt. 1909, pp. 353–417, pl. 1, figs. 11*).—A report for the year ended October 31, 1909.

Under the heading of Insecticide Records, the author briefly considers tests with the arsenicals, sulphur solutions and compounds, vacuum oil, San-u-Zay scale oil, Cooper's V_2 fluid, Aspinwall's insecticide, and tobacco preparations.

The Chinese mantid is said to have definitely established itself in the State. Plant lice appeared in great numbers throughout the season. An outbreak of the army worm occurred at a number of points in 3 counties during the middle and latter half of June.

A report of investigations of root maggots in continuation of those previously noted (E. S. R., 22, p. 159) conducted by E. L. Dickerson is incorporated in the report (pp. 381–392). At Mercerville it was found on May 5 that oviposition had commenced on cabbage plants. In one patch "specimens of the red mite (*Trombidium sericium*) were noted—sometimes 2 about a single plant, in the work of destroying the eggs. In this patch several specimens of cynipid parasite were also observed. In most cases they were moving actively upon the stems of the plants, but one was noted below the surface." A strong solution of carbolic acid emulsion sprayed about the roots of cabbage plants on May 3, after the soil had been removed, did not injure the plants, but apparently killed all the maggots with which it came in contact.

The infestation of onions was found to be over by July 1, at which time all the flies had disappeared. *Pegomyia vicina* was observed June 7 working in beet leaves. The eggs, in clusters and from 1 to a dozen, were always placed on the underside of the leaves, in which the maggots burrowed between the upper and under surfaces. Carbolic acid emulsion made up of 10 qt. of acid, 10 lbs. of soap, and 10 gal. of water, much stronger than anything recommended, was used on May 18 at the rate of 1 gal. to 10 gal. of water after the soil had been removed from about the onions. The application killed the maggots wherever it came in contact with them and apparently did not injure the plants. Applications were made on May 8 and again on May 17 to rows of young onions on another place, but no difference was noted between the treated and check rows when examined June 12. "It appears that the carbolic acid emulsion is an effective killing agent when used at the proper strength. But it must be begun early and used frequently enough to reach the maggots."

A carbolic acid fertilizer was applied in late April, just before the onion seed was sown, at the rate of 400 lbs. to the acre. and along other rows on May 8 and May 17, after the onions had sprouted, and again twice at weekly intervals. An examination made in early June showed that the material had not had any beneficial effect. An examination made in May of onions grown on soil treated with Apterite, applied broadcast on April 6 at the rate of 300 lbs. to the acre, showed no difference between treated and untreated areas, both being equally infested.

Examinations made June 7 of plats on which gas tar, 1 part to 25 parts of sand had been used, showed cauliflower and cabbage to be in fine condition, while on another farm where no application had been made considerable infestation was found.

It was found "that both *brassicæ* and *fusciceps* may pass the winter in the pupal stage and emerge during early May for a period of several days—perhaps half a month, or even longer; that both pupæ covered deeply, and those at the surface produced flies as well as those at a normal depth." The rearings from 9 lots of maggots collected from cabbages, radishes, cauliflowers, and wild radishes are reported upon.

The other insects briefly considered are: San José scale, codling moth, *Vespa crabro* (which attacked ripe apples), pear psylla, plum curculio, peach borer, rose chafer, cranberry flea beetle (*Systena hudsonica*), elm-leaf beetle, gipsy and brown-tail moths, bronze birch borer (*Agrilus anxius*), and hickory-bark beetle.

Report of the superintendent of entomology for 1909–10, E. M. EHRHORN ([*Bien.*] *Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 1909–10, pp. 103–151, pls. 7*).—In the reports here submitted the details of inspection work are presented, together with lists of the insects intercepted, etc.

Blastophaga grossorum, which was introduced into Moanalua in May, 1909, appears to have become established. The work with parasites of the horn fly received from abroad during 1909 is reported by O. H. Swezey, and for 1910 by R. C. L. Perkins; the cryptid *Bathymetis* sp. was the only parasite that was bred successfully after arriving on the island. A brief account is given of fruit flies and a draft of the new rules and regulations for the prevention of the distribution of the Mediterranean fruit fly (*Ceratitis capitata*), which as previously noted (E. S. R., 24, p. 255) has been introduced into the island of Oahu. An additional rule and regulation concerning the importation of all banana fruit, banana shoots, and plants with a view to preventing the introduction of *Fusarium cubense*, which causes the banana blight, is included.

Correspondence with H. W. Henshaw, of the Biological Survey of this Department, in regard to the desirability of introducing foreign birds into the Hawaiian Islands for the purpose of destroying noxious insects is appended.

Report of the assistant entomologist, H. O. Marsh (*[Bien.] Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 1909–10, pp. 152–159*).—Experiments on the control of several insect enemies of truck crops, etc., including the Japanese beetle (*Adoretus tenuimaculatus*), the melon fly (*Dacus cucurbitæ*), the alligator pear mealy bug (*Pseudococcus nipæ*), the chrysanthemum plant louse (*Macrosiphum sanborni*), the beet worm (*Hymenia fascialis*), and insects affecting the cabbage are briefly reported.

Report on injurious insects in Finland, 1908, E. Reuter (*Landtbr. Styr. Meddel. [Finland], 1910, No. 73, pp. 25*).—The author discusses the occurrence of insect pests during the year. *Charæas graminis* was the source of injury in the district of Österbotten, and the chrysomelid beetle *Phœadn armoraciæ* is said to have injured turnips.

Some insect pests of India, H. E. Houghton and M. Adinarayanaiyah (*Cent. Agr. Com. Madras Bul. 10, 1911, pp. 6, figs. 2*).—The insect pests noted are the rice bug (*Narai puchi*), rice hispa, 2 coconut beetles, tobacco caterpillar, and cane borers.

Research work—Parasites, F. Tidswell (*Rpt. Govt. Bur. Microbiol. N. S. Wales, 1909, pp. 74–99*).—The author presents a list of the parasites occurring in Australia, descriptions of certain parasites met with during the year, and brief notes on trematodes and nematodes. See also a previous note by Cleland and Johnston (E. S. R., 24, p. 785).

Synopsis, catalogue, and bibliography of North American Thysanoptera, with descriptions of new species, D. Moulton (*U. S. Dept. Agr., Bur. Ent. Bul. 21, tech. ser., pp. 56, pls. 6*).—This synopsis and catalogue lists a total of 118 species and varieties, representing 40 genera. Two genera, 10 species, and 1 variety are described as new to science.

Burning chinch bugs, T. J. Headlee (*Kansas Sta. Circ. 16, pp. 7, figs. 6*).—Attention is called to the fact that during the fall chinch bugs gather in large numbers in clump-forming grasses of badly infested sections and that most of them can be destroyed by running fire over the infested grass lands in such a way as to burn these clumps down close to the crowns.

Report of entomologist, E. W. Berger (*Florida Sta. Rpt. 1910, pp. xxxv–xliv*).—The greater part of this report is devoted to an account of sprayings made with red Aschersonia, a general discussion of which has been previously noted (E. S. R., 24, p. 355), and to the white fly situation in Florida in general.

It is stated that, as a whole, the fungus work with the white fly at Gainesville was a success. A sharp frost on December 30 and 31, 1909, defoliated many trees in a part of the experimental grove, resulting in a great loss of fungus but also causing a reduction of the white fly. Fungus collected on March 11, 1909, was kept in cold storage until August 8. Three lots exposed in various ways to temperatures of 12°, 26°, and 36° F., respectively, were sprayed August 11 on sterilized sweet potato, but only spores from the lot exposed to the temperature of 26° developed.

On trees sprayed August 17, 1909, with potash whale-oil soap No. 3, at the rate of 1 lb. to 9 gal. of water, 90 per cent of all larvæ were destroyed. Similar results were obtained from the use of Golddust and whale-oil soap in a Satsuma grove. As previously observed, these spraying solutions did not retard the development of the fungus in the least. Whale-oil soap No. 3, 1 lb. to 6 gal. of water, also a mixture of whale-oil soap and baking soda at the rate of 1 lb. of the former to 1½ lb. of the latter, in 8 gal. of water, destroyed nearly all larvæ up to the thickened condition of the fourth stage. Spraying experiments showed that ½ lb. of washing soda to 1 gal. of water and ½ lb. of borax to 1 gal. of water give no beneficial results. Black leaf tobacco extract at the rate of

1 part to 65 of water was found to be a far less effective agent against all stages than are soaps and other contact insecticides.

In August, 1909, specimens of *Aleyrodes nubifera* were received from Lemon City, in Dade County, and later in the month it was found distributed in small numbers from north of Lemon City to Buena Vista and to the Bay Front. While the source of the infestation could not be determined, it was evident that the fly had been present longer than 2 years, and possibly 5 or 6, judging from its distribution. An examination made in September, 1909, to determine the number of adult white flies that are bred and liberated in a large China umbrella tree in Gainesville showed an average of 7.3 empty pupa cases per leaflet; 0.7 third-stage larvæ; 12 fourth-stage larvæ; and 4.2 pupæ (an average for the 4 stages of 24.2); together with 1 dead larva.

The author concludes that when a freeze sufficient to nearly or completely defoliate trees occurs, the effects of such upon the white fly are about equivalent to a fumigation with hydrocyanic-acid gas.

Dipping peach trees to control peach root aphis, M. A. BLAKE and A. J. FARLEY (*New Jersey Stas. Rpt. 1909, pp. 88–93, pls. 2*).—Dipping experiments in which lime-sulphur made by boiling 15 lbs. of stone lime, 15 lbs. of sulphur, and 50 gal. of water for 1 hour; Scalecide 1 part to 16 of water; and whale-oil soap 1 lb. to 3 gal. of water, were used, are briefly reported.

"Three lots of 40 Elberta trees and 1 lot of 80 Elberta trees were selected for the experiment. One lot of 40 trees had their roots thoroughly dipped in the lime-sulphur solution, and another lot of 40 trees were dipped in Scalecide; 80 trees had their roots dipped in the whale-oil soap solution, and 40 trees were reserved without dipping for check trees. After the trees were dipped they were allowed to dry off slightly and were then 'heeled in.' . . . None of the trees failed to grow except 1 which was dipped in the whale-oil soap solution and it is very doubtful if the dipping was a factor in the death of the tree. All the trees made a very good growth during the season of 1908 and although in some instances it was possible to detect differences in growth between the various rows, these differences were not great enough on all the plats to permit of conclusive judgment by observation." In the late fall of 1908, after the leaves had fallen, measurements were taken of the annual growth made by each tree.

"The 40 trees dipped in lime-sulphur made a slightly better average growth than the undipped trees, but a comparison with the trees dipped in whale-oil soap solution seems to indicate that it is likely that the lime-sulphur checked the growth of the trees nearly as much as the aphis. The trees dipped in Scalecide made a somewhat better average growth than the lot dipped in lime-sulphur but some checking of growth is also apparently indicated. One average of 40 trees dipped in whale-oil soap solution shows an average increase of 96.3 in. of growth over the undipped trees, and the average of the other 40 trees dipped in whale-oil soap solution shows an average increase of over 200 in. of growth over the undipped trees. This indicates that the dipping was of considerable value."

Some experiments on the chrysanthemum plant louse (Macrosiphum sanborni) H. O. MARSH ([*Bien.*] *Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 1909–10, pp. 160–172, pls. 3*).—As a result of control experiments here reported, the author recommends the use of a mixture of Blackleaf 40 1¼ oz. and whale-oil soap 4 oz. to 5 gal. of water. The larvæ and pupæ of *Leucopis nigricornis*, the most abundant natural enemy of this plant louse, are not injured by this mixture.

The acidity of the sap of American vines in relation to their resistance to phylloxera, according to Comes, R. AVERNA-SACCÀ (*Abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 386*).—The author's investigations have led him to the following conclusions:

"Every circumstance which tends to decrease the natural acidity of the vines must tend to weaken their resistance to phylloxera. And since, in the South, the warm, dry condition of the plains, the superabundance of lime in the soil, and the careful cultivation (especially with farmyard manure) tend to diminish the acidity of the plants, it is clear that in sunny wine-growing regions of the South, in calcareous soils and in vineyards where there is intense cultivation, the original resistance of the American vines to phylloxera is enfeebled by degrees, and with time the vines reconstituted on American stocks deteriorate more or less seriously."

Papers on Coccidæ or scale insects.—Catalogue of recently described Coccidæ, III, E. R. SASSCER (*U. S. Dept. Agr., Bur. Ent. Bul. 16, pt. 4, tech. ser., pp. 61–74*).—This part, which is in continuation of the catalogue by J. G. Sanders previously noted (E. S. R., 22, p. 554), is thought to be fairly complete up to March, 1911. It refers to 3 new subgenera, 98 new species, and 5 new varieties of scale insects.

Damage to sugar cane in Louisiana by the sugar-cane borer, T. C. BARBER (*U. S. Dept. Agr., Bur. Ent. Circ. 139, pp. 12*).—This borer has been the most serious enemy of sugar cane with which the Louisiana planter has had to contend for many years. During the course of observations and experiments conducted by the author in 1910, it was found to be responsible for much injury that is not apparent at first sight.

"Its harmful work begins with the destruction of eyes of seed cane, reducing the stand during the following year; continues through the growing season of the cane by stunting its growth, and causing damage from windstorms, owing to the weakening of the stalk due to the burrows and girdles; and ends by causing a much lower percentage of juice, which is again of a much poorer quality in infested canes than in uninfested canes. The last is an important form of injury, which appears to have been overlooked by investigators and planters. Moreover, the holes made by the cane borers are the chief means of entrance to the stalk afforded the various fungus diseases of the sugar cane. The tonnage yield per acre is reduced by borers, and the average weight of canes otherwise similar in appearance is found to be reduced by borer infestation."

The subject is taken up under the headings of injury to seed cane, injury to growing cane, and injury to mature cane and juice. Counts made of 3,834 canes showed 1,313 to be borer-free and 2,521, or 65.75 per cent, infested by the borer. Investigations conducted indicate that the difference in yield between borer-free and borer-infested cane fields amounts to about 1 ton of cane per acre when the borer-free cane gives a yield of 25 tons per acre, and that there is a loss of 1,078.5 lbs. of sucrose per acre.

Investigations of methods of control are now under way.

The root borer of the sugar cane (*Agr. News [Barbados], 10 (1911), No. 240, p. 218, figs. 2*).—The sugar cane root borer (*Diaprepes abbreviatus*), which appeared as a serious pest in a limited area in Barbados at the end of 1909 and early in 1910, was again in evidence and caused serious injury to ripening sugar cane during the early months of 1911.

Biology of the cochylis and eudemis moths, P. MARCHAL (*Rev. Vit., 35 (1911), Nos. 903, pp. 381–385; 904, pp. 419–423*).—The author presents a brief account of the biology of *Cochylis ambiguella* and *Eudemis botrana*, 2 of the more important insect enemies of the grape in France and other European countries.

Combating the wood-boring caterpillars of Zeuzera pyrina in cork-oak forests, P. LESNE (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 19, pp. 1269–1271*).—In continuing work with this pest (E. S. R., 20, p. 354) the author in applying carbon bisulphid has made use of long slender gelatine capsules that can be readily introduced into the galleries. Experience has shown that 24 hours is a sufficient period of time for the capsule to be dissolved by the moisture present in the galleries and the larvæ destroyed.

The injury to sugar beets by the Wintersaateule (Agrotis sp.) and methods of combating it, WASSILIEW (*Bl. Zuckerrübenbau, 17 (1910), No. 20, pp. 330–332; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 379*).—Agrotis larvæ are said to be the source of considerable injury to sugar beets in the Government of Kiew, Russia; they first consume the leaves and later the other parts of the plant.

Report of mosquito work for 1909, J. B. SMITH (*New Jersey Stas. Rpt. 1909, pp. 421–459, figs. 3*).—During the year 300,800 ft. of ditching were dug and 2,672 acres drained, making a total of 3,464,974 ft. of ditching dug and 25,192 acres drained to date.

Brief mention is made of bats as enemies of mosquitoes and of an investigation made of the water plant (*Azolla* sp.), previously noted (E. S. R., 24, p. 562). Experiments conducted with iron sulphate and *Culex pipiens* larvæ show that at the rate of 1 oz. to 1 gal. of water this material is a good, and at double that rate, an effective destroyer of mosquito larvæ and pupæ. Under some circumstances it may be useful on a limited scale, but it will do nothing that petroleum will not do at much less expense.

The author finds that a concentrated extract like Nico-fume is an exceedingly violent larvacide, and at the rate of 1 part to 2,500 of water will kill all larvæ of *C. pipiens*. In experiments with Hyco it was found that at a dilution of 1 to 30,000 it can be relied upon to kill all larvæ, except, perhaps, those just ready to pupate, but that 1 to 10,000 is the extreme limit of dilution effective against pupæ and that, even here, adults would probably emerge safely from pupæ just ready to transform. Under natural conditions no lasting results follow on the treated area, and within a day or 2 after the application the water is again safe for mosquito development.

A systematic fumigation of cellars in Newark and vicinity where mosquitoes hibernate in immense numbers, thousands in a single cellar in some instances, was discontinued after a few days, as the results were not as satisfactory as was expected. A chemical analysis of the stramonium used showed that the alkaloidal content of the drug varies greatly. When the material is stored, unless it is kept in very tight receptacles, it loses in strength and may in time become almost inert. The alkaloidal content of 6 samples of stramonium from as many different sources was found to be 0.32, 0.24, 0.15, 0.24, 0.02, and 0.12 per cent, respectively. The first, second, and fourth mentioned represent fresh, full-strength material; the third, fifth, and sixth represent the run of the market, ranging from fair to almost inert, the fifth being of little more value than so much dried hay.

The details of inspections made along the shore and in the vicinity of various cities follow. Notes of the Season, by J. A. Grossbeck (pp. 457–459), are appended to the report. The author finds that where natural breeding places are scarce, it is quite possible to attract *C. pipiens* for a considerable distance around to an artificial area where they can be kept under observation and control. "It seems indicated, also, that when such an attractive place is provided, the insects do not so readily bite or frequent even near-by dwellings.

This sort of trapping is quite feasible around any house with a garden, but it means also that the tub or pail must not be forgotten long enough to allow any brood to come to maturity. The larvæ can be killed off every few days with tobacco extract without affecting the water as to attractiveness for oviposition. . . . *C. salinaris* larvæ were found on Gillmore's Island on the Barnegat bay shore as late as December 1, 1908, not yet full grown."

Brief notes are also presented on *C. aurifer*, *C. restuans*, and *Anopheles punctipennis*.

Cerebral localization of a larval Œstrus, D. Blasi (*Rev. Med. Vet. Montevideo, 1 (1910), No. 11, pp. 430, 431; abs. in Vet. Rec., 23 (1911), No. 1187, p. 652*).—The author reports the case of a sheep, 1½ years of age, in the right lateral ventricle of the brain of which a larva of *Œstrus ovis* was found.

Introduction into Italy of an Indian hymenopteron to destroy the orange fly, F. Silvestri (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 4 (1910), pp. 228–245, figs. 8; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 375*).—*Syntomosphyrum indicum* n. sp., a parasite of *Ceratitis capitata*, which was introduced from India into Italy in 1909 has been bred in large numbers, about 10,000 being distributed at Rosarno, Calabria.

Experiments with Drosophila ampelophila concerning evolution, F. E. Lutz (*Carnegie Inst. Washington Pub. 143, 1911, pp. 40, figs. 53*).—The greater part of this work deals with the inheritance of abnormal venation (pp. 1–35). The effect of sexual selection and disuse and degeneration are also briefly considered.

In regard to breeding habits the author states that this red-eyed pomace fly "is very common about cider mills, ripe fruit, vinegar barrels, and the like. The larvæ normally live in the pulp of rotting fruits, especially during the acetic acid stage of decay. They will, however, thrive on the side of a tumbler containing fruit juices, and I have reared them through several generations on stale beer. At a temperature of 25° C. the eggs hatch in 40 hours or less. The duration of the larval period is, on the average, 5 days and of the pupal period 4⅔ days. The adults become sexually mature about 48 hours after emergence when kept at this temperature. They live for about 3 weeks. The mean number of eggs is close to 200. Copulation is repeated and frequent."

Injury by the adult spotted Pentodon, P. Hébert and F. Aussenac (*Jour. Agr. Prat., n. ser., 20 (1910), No. 46, pp. 626, 627; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, pp. 381, 382*).—The authors report that in the adult stage *Pentodon punctatus* is the source of injury to lettuce in La Reole, Gironde, through gnawing the roots.

Metamorphosis of Cybocephalus rufifrons, and information concerning its habits, F. Silvestri (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 4 (1910), pp. 221–227, figs. 6; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 375*).—The author finds that the adult beetle lives on the branches and in cracks in the bark of mulberry trees infected with *Diaspis pentagona*. This scale is frequently destroyed by *rufifrons* larvæ.

The life history and control of the cacao beetle (Steirastoma depressum), P. L. Guppy (*Bd. Agr. Trinidad Circ. 1, 1911, pp. 33+III, pls. 4, figs. 4*).—This is a detailed report of an investigation of the biology and of remedial measures for the cacao beetle.

An annotated bibliography of the Mexican cotton boll weevil, F. C. Bishopp (*U. S. Dept. Agr., Bur. Ent. Circ. 140, pp. 30*).—This annotated bibliography of 297 titles is intended to serve as an index to the extensive literature on the Mexican cotton boll weevil.

FOODS—HUMAN NUTRITION.

Treatise on biochemistry, E. LAMBLING (*Précis de Biochimie. Paris, 1911, pp. 600+32*).—In this general treatise such questions are considered as the laws of energy in the animal body, protein and other nutrients, diastases, digestion and absorption of food, micro-organisms and their rôle in digestion, fermentation and intestinal putrefaction, and various problems of metabolism.

A treatise on foods and their effects upon health and the physical and moral life, S. P. SNYDER (*Dayton, Ohio, 1910, 2. ed., rev. and enl., pp. IX+183, pl. 1*).—The author has collected a large number of recipes, the bulk of them for the preparation of simple dishes, and has discussed the effects of foods with relation to health, and other matters. In these discussions he makes little or no reference to the numerous scientific investigations of nutrition topics which have been published by many investigators, while theories such as are commonly advanced by different food cults are given great prominence. The general deductions are not such as are commonly advocated by students of physiology and nutrition.

Food adulteration, its detection and control, A. BEYTHIEN (*Samml. Chem. u. Chem. Tech. Vorträge, 16 (1910), No. 1–3, pp. 140*).—A valuable digest of data.

[Food control], D. A. DE JONG ET AL. (*Trans. IX. Internat. Vet. Cong. The Hague. 4 (1909), pp. 246, figs. 3, dgm. 1*).—Food control, tropical diseases, and questions of animal production and veterinary medicine are considered with reference to hygiene.

Compilation of analyses of East Indian food materials, J. E. Q. BOSZ (*Bul. Kolon. Mus. Haarlem, 1911, No. 46, pp. 261, chart 1*).—A large number of analyses of food materials, including tropical fruits and other local products, are given in this extended compilation of data.

A colored chart which summarizes data graphically is appended.

The retail butcher, R. S. MATTHEWS (*Memphis, Tenn., 1911, pp. 101, pl. 1, figs. 2, charts 4*).—The proportion of the different cuts which a carcass yields, the sum at which different cuts should be sold in order to give a definite profit, methods of curing meat, and other questions are discussed with special reference to retail trade conditions.

Modern practice of canning meats, G. T. HAMEL (*St. Louis, 1911, pp. 100, figs. 19, dgm. 1*).—Theories of canning are discussed, equipment described, and recipes and formulas given in this handbook, which considers the subject from the standpoint of the small plant as well as from that of the large establishment.

The use of horse intestines as sausage cases, M. MÜLLER (*Ztschr. Fleisch u. Milchhyg., 21 (1910), No. 1, pp. 3–10*).—From experimental studies by the biological method the author concludes that the use of horse intestines as casing for sausage made without the addition of horseflesh may give results which will lead to erroneous conclusions regarding the character of the sausage.

The influence of meat extractives upon the resorption of nutritive material—the physiological nutritive value of meat extract, W. VÖLTZ and A. BAUDREXEL (*Pflüger's Arch. Physiol., 138 (1911), No. 4–6, pp. 275–291*).—In experiments with dogs the conclusion is drawn that adding meat extract to a basal ration which did not contain organic flavoring bodies did not increase the resorption of either nitrogenous or nitrogen-free nutrients. Under favorable conditions the protein-free extractives of meat assist in nitrogen retention in that the nitrogen loss on an insufficient diet is diminished by a value equivalent to at least 11 per cent of the nitrogen administered in the form of extractives. The physiological nutritive value of meat extractives is, in round numbers, two-thirds of their energy value.

Preparation of salmon caviar, L. Maynard (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 109, pp. 615–617*).—The manufacture and use of salmon caviar, market conditions, and other similar topics are considered.

The introduction of milk into the army diet in Austria, A. R. Erlbeck (*Milch Ztg., 39 (1910), No. 47, pp. 553, 554*).—Some information is summarized regarding attempts made to use larger quantities of milk in soldiers' rations, on account of its reasonable cost in proportion to the nutritive material it supplies.

The specific gravity of bread in relation to its water content, A. J. J. Vandevelde and A. Revijn (*Separate from Verslag. en Meded. K. Vlaam. Acad. Taal en Letterk., 1910, pp. 8*).—The study reported constitutes the seventh report from the School of Nutrition of the City Laboratory of Ghent.

From determinations of the weight, volume, specific gravity, and water content of bread baked in different ways some general conclusions were drawn. The specific gravity of the loaf appears to be more dependent upon the quality of the flour than upon the weight or form of the loaf or the method of baking. It is higher in small than in large loaves, though exceptions occur. The water content of the bread diminishes regularly during baking. The form of the loaf apparently exercises no effect upon this factor.

Bread—its value in the ration, G. H. Estes (*Infantry Jour., 7 (1911), No. 5, pp. 716–726*).—The composition and use of bread, bread making, and other similar questions are considered with special reference to army conditions.

[Supplying bread to farm employees], J. Bénard (*Jour. Agr. Prat., n. ser., 20 (1910), No. 50, p. 753*).—A project is described by which bread is made and sold at low cost to employees.

Concerning bananas, K. Yoshimura (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1910), No. 7, pp. 406–411*).—Studies are reported of bananas at different stages during the ripening period, from which the author concludes that the tannin content of the banana remains unchanged during ripening. Starch is changed into saccharose, which later is in part or wholly inverted by means of invertase, there being no constant relation between the saccharose and invert sugar. No sugars except these two were found in bananas.

Vinegar, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 223, pp. 19*).—Data are given regarding the examination of 84 samples of vinegar, and vinegar standards are proposed.

A new coffee adulterant, C. Griebel and E. Bergmann (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 8, pp. 481–484, figs. 3*).—According to the authors, the principal materials found as coffee adulterants in Berlin are the seed of blue lupines (*Lupinus angustifolius*), and more recently the seed of common vetch (*Lathyrus sativus*). The seed of this vetch, when used for a long time, may induce chronic poisoning. With a view to detecting the presence of vetch seeds, their appearance and histological structure are described and a proximate analysis reported of the raw seed.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 136, pp. 2*).—This decision has to do with the labeling of chocolate and cocoa.

After considering evidence submitted, the board of food and drug inspection reached the conclusion that the definitions laid down in a previous publication (E. S. R., 18, p. 459) are substantially correct.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 137, p. 1*).—This decision has to do with the use of charlock as a substitute for mustard.

In the opinion of the board of food and drug inspection, when such a substitution is made the label should clearly state the fact.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 846, pp. 8; 848–849, pp. 2 each; 850, pp. 16; 851, pp. 2; 852, p. 1; 853–858, pp. 2 each; 859, p. 1; 860–866, pp. 2 each; 869–870, p. 1 each; 871–872, pp. 2 each; 873, pp. 4; 874, pp. 3; 875–876, pp. 2 each; 877, pp. 3; 878–880, p. 1 each; 881–882, pp. 2 each; 883, p. 1; 884–885, pp. 2 each; 886–890, p. 1 each; 891–892, pp. 2 each; 893, p. 1; 894, pp. 2*).—These notices of judgment have to do with the misbranding of molasses, macaroni, Mohawk brand Neufchatel cream cheese, drug products, sorghum sirup, "Uncle Sam antidyspeptic breakfast food," bottled beer, cheese, compound fruit jelly, asthma cure and blood cures, and sirup; the adulteration of Maclaren's imperial cheese, desiccated eggs, crystal eggs, olives, frozen eggs, turpentine, tomato pulp, corn meal, tomato catsup, frozen egg product, and tomato paste; the adulteration and misbranding of vinegar, apricot brandy and blackberry cordial, orange flavor, a food product, orange extract, canned tomatoes, Ozone vichy water, drug products, powdered cloves, vanilla extract, and strawberry fruit flavor and raspberry fruit sirup; the misbranding and alleged adulteration of vinegar; and the alleged adulteration of a drug product.

Eighth biennial report of the dairy and food commissioner for the biennial period ending October 31, 1910, L. DAVIES (*Bien. Rpt. Dairy and Food Comr. Wash., 8 (1909–10), pp. 55*).—Of the 1,164 samples of extracts, honey, spices, baking powder, condensed milk, breakfast food, ice-cream cones, and other materials examined, 831 were found to comply with the law, while 333 were illegal. The work of the department, including dairy inspection, is discussed at length.

[Diet of South American natives], P. WALLE (In *Au Pays de l'Or Noir. Paris [1909], pp. 26, 27*).—Fish, meat, cassava flour, and Indian corn are mentioned as staple foods in this brief account of food habits and dietary customs of South American natives.

Cost of living in American towns, H. L. SMITH (*London: Govt., 1911, pp. XCII+533, map 1; U. S. Senate, 62. Cong., 1. Sess., Doc. 22, pp. XCII+533*).—Continuing work previously noted (E. S. R., 23, p. 169), extended studies were made in 28 American towns on or east of the Mississippi River, their aggregate population in 1910 being 15,488,140.

The range of price levels for rents was found to vary greatly, being highest in New York City. The prices of the principal foodstuffs, such as bread, flour, meat, potatoes, and sugar, did not show great range in the different towns, as was evident from the fact that when each article is considered in its relative importance the lowest level is 91 and the highest 109, with New York midway counting as 100. "If the towns are grouped geographically the New England and southern groups show the highest food price levels, the Middle West towns the lowest, the position of the New England towns in regard both to wages and rents being here reversed."

As regards retail prices of foods, the conclusion is that the ratio between the United States and England and Wales is 138 to 100.

"One peculiarity shown by the budgets is the comparatively small consumption of baker's bread in the average American working-class family, the consumption being 8¼ lbs. weekly per family as against 22 lbs. in the United Kingdom, the place of bread being taken in the United States to some extent by rolls, cakes, biscuits, etc., on which the expenditure is about three times as great as that shown in the average British budget. On the other hand, the consumption of meat is much larger in the United States, and the consumption of vegetables is also larger. The budgets indicate in general that the dietary of American working-class families is more liberal and more varied than that of corresponding families in the United Kingdom."

For purposes of comparison it is calculated that if an English workman with an average family were maintained under American conditions in the same standard as regards food consumption to which he has been accustomed his wages "would be higher in the United States by about 130 per cent, with slightly shorter hours, while on the other hand his expenditure on food and rent would be higher by about 52 per cent."

In addition to general discussions the report contains the details of the family budgets and other statistical data collected.

Cost of living in American towns, H. L. Smith (*U. S. Senate, 62. Cong., 1. Sess., Doc. 38, pp. 74; U. S. Dept. Com. and Labor, Bur. Labor Bul. 93, pp. 500–570*).—A summary of the above.

Cost of living in Switzerland, D. L. Murphy (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 118, pp. 792, 793*).—In connection with this summary of statistical data some information is given regarding an attempt made in St. Gall to lower prices by eliminating middlemen.

Report of an investigation of the methods of fiscal control of state institutions, H. C. Wright (*State Charities Aid Assoc.* [*N. Y.*] *Pub. 122, 1911, pp. 353*).—Two papers are included in this report, namely, a study of methods of fiscal control in state institutions in New York, and a comparison of the methods of fiscal control in state institutions in New York, Indiana, and Iowa.

From an extended study of the kind and character of foods and other supplies and the situation as a whole in state institutions in New York, the author concludes that the joint contract system followed in the purchase of supplies is subject to many criticisms and that such centralization is not necessarily economical. The detailed criticisms are of especial interest to those concerned with questions of institution management, as is also the critical comparison of the methods of purchasing supplies in New York, Iowa, and Indiana, reported in the second paper.

According to the author's conclusions, "an institution with an inmate population of 400 or over can ordinarily secure as low prices as can a central body with power to contract for large quantities. . . .

"In those institutions which seem to do the best work and seem to care for the inmates most satisfactorily, the superintendent is given, under the general direction of the board of managers, a large degree of liberty with a corresponding responsibility."

From the data which he secured the author has calculated the food supplied annually per capita and its cost, and the protein and energy content of the food supplied per man per day in 13 institutions in New York, 9 in Indiana, and 7 in Iowa, including hospitals for the insane, soldiers' homes, industrial schools, reformatories, prisons, and institutions for the feeble-minded and for epileptics. Average data are summarized in the following table:

Average food per man per year and nutritive value of daily ration in public institutions.

Location of institutions.	Food per man per year.		Food per man per day.	
	Total amount.	Cost.	Protein.	Energy.
	Pounds.		*Grams.*	*Calories.*
New York	1,227	$45.05	104.62	3,313
Indiana	1,176	43.03	98.78	3,429
Iowa	1,423	55.48	106.47	3,691

The diet in different institutions is discussed at length and much interesting material is recorded.

The report contains an introduction by H. Folks.

Housekeeping efficiency, C. Barnard (*Housekeeping Expt. Sta. [Conn.] Bul. 11, pp. 20, pls. 3*).—Increased efficiency through correct house planning, the use of conveniences and labor-saving devices, and the elimination of needless work are discussed, and data recorded regarding the actual labor involved in performing a definite task by different methods.

[Problems of infant feeding] (*Amer. Assoc. Study and Prev. Infant Mortality Trans., 1 (1910), pp. 356, pls. 11, dgms. 38*).—Papers which have to do with problems of infant feeding, milk supply, questions of home management, education, and similar subjects are included in this report of the annual meeting held in Baltimore, Md., November 9–11, 1910.

The time food remains in the body, and intestinal activity as affected by treatment by warm flushing, A. Hiller (*Deut. Med. Wchnschr., 37 (1911), No. 17, pp. 781–784, dgm. 1*).—According to the author's conclusions, any given meal does not pass through the intestine as a continuous mass, but various portions may be widely separated during digestion. The influence of intestinal movements on the passage of food through the digestive tract is discussed. It was found that with healthy individuals food remained in the intestine from 18 to 42 hours. Raw peas were used as markers. Data obtained under pathological conditions are also discussed.

The tryptic digestion of casein, M. Siegfried (*Pflüger's Arch. Physiol., 136 (1910), pp. 185–202*).—The results of an extended study are reported. According to the author, trypsin-casein-peptone on hydrolysis yields the largest amount of ammonia and the smallest amount of nitrogenous material precipitated by phosphotungstic acid of any of the materials studied by the method used.

The constitution of protein and its cleavage and synthesis in the animal body, I. König (*Sitzber. Naturhist. Ver. Preuss. Rheinlande u. Westfalens, 1910, No. 1, Sect. C, pp. 4–12*).—A valuable summary of data on this important subject.

The influence of caffein on protein metabolism in dogs, with some remarks on demethylation in the body, W. Salant and I. K. Phelps (*Jour. Pharmacol. and Expt. Ther., 2 (1911), No. 4, pp. 401, 402*).—The results of experiments were reported in a paper presented at the second annual meeting of the American Society for Pharmacology and Experimental Therapeutics.

"The resistance to caffein was found to vary with the amounts of the urinary purins eliminated."

The elimination of creatin and creatinin after the administration of caffein, W. Salant and J. B. Rieger (*Jour. Pharmacol. and Expt. Ther., 2 (1911), No. 4, pp. 400, 401*).—A brief abstract of a paper presented at the second annual meeting of the American Society for Pharmacology and Experimental Therapeutics.

According to the authors, experiments on rabbits indicate that urinary creatin is increased after the administration of caffein, the size of the dose being an important factor. Neither the increased diuresis nor the diminished appetite observed could, in the authors' opinion, be regarded as a factor in accounting for the increased output of creatin. "The elimination of the creatinin was variable in some rabbits, but in most of them it was practically not affected by caffein."

Chemical and microscopical studies of the transportation of fat through the intestinal wall in resorption, A. Noll (*Pflüger's Arch. Physiol., 136 (1910), pp. 208–247*).—In general, the author concludes, on the basis of his experimental evidence, that the phenomena of fat transportation which can be detected with the microscope represent only a part of the entire process.

A strength and endurance test, C. F. LANGWORTHY (*Science, n. ser., 33 (1911), No. 853, pp. 708–711*).—In a contest entered into for a wager 48 men endeavored to carry on the back a weight of 100 lbs. for approximately 10 miles. Of this number 6 completed the task, while the others dropped out at various stages. The information collected from a number of the men showed that they lived on a simple mixed diet. The energy expended in moving the body and carrying the load over the course was calculated to be 1,137 calories on an average for the 6 successful contestants, of which amount 707 calories would represent the energy expenditure for motion of forward progression and 430 calories the energy expended in moving the load.

Similar calculations for individuals and for groups are reported.

It seems fair to conclude that the men who engaged in the contest were, as regards their food, their occupation, and their general living conditions, representative of a very large group of our population who are living comfortably and meeting their daily obligations in a creditable manner, who are, in fact, living the average life of the average man, with its varied activities and interests.

"In so far as the recorded data throw light on the subject, they indicate that the average man living the average life is capable of meeting body demands of considerable severity—a conclusion which perhaps few would question, but which it is interesting to consider in the light of numerical data."

Effects on men at rest of breathing oxygen-rich gas mixtures, F. G. BENEDICT and H. L. HIGGINS (*Amer. Jour. Physiol., 28 (1911), No. 1, pp. 1–28, fig. 1*).—From tests with normal individuals lying down at complete muscular rest 12 hours after the last meal and breathing air mixtures containing 40, 60, and 90 per cent oxygen, respectively, it was found "that there is no apparent difference between the metabolism as indicated by the gaseous exchange (i. e., the carbon dioxid output, oxygen consumption, and respiratory quotient) and the metabolism when breathing ordinary air; that there is no change in the respiration, either as to character, depth, or frequency, as compared with the same factors when breathing ordinary air; [and] that the pulse rate is lower with oxygen-rich mixtures than when breathing ordinary air; furthermore, that the higher the percentage of oxygen breathed (up to 90 per cent), the lower the pulse."

A respiration apparatus for the determination of the carbon dioxid produced by small animals, F. G. BENEDICT and J. HOMANS (*Amer. Jour. Physiol., 28 (1911), No. 1, pp. 29–48, dgms. 2*).—A respiration apparatus of a size suitable for experiments with small animals has been constructed and is described. A kymograph is used in connection with it to indicate the muscular activity of the animal.

According to the authors, the closed-chamber method for determining carbon dioxid in short experiments with small animals is to be strongly recommended for a preliminary survey of many research problems in animal metabolism, though it is not offered as a substitute for direct determinations of oxygen and heat.

Handbook of physiological methods.—Nutrition, edited by R. TIGERSTEDT (*Handbuch der Physiologischen Methodik. Ernährung. Leipsic, 1911, vol. 1, pt. 3, pp. 228, figs. 137*).—Three papers are included in this handbook, namely: Metabolism, by W. Caspari and N. Zuntz; Respiration Apparatus, by R. Tigerstedt; and Calorimetry, by M. Rubner, each of which provides a historical and critical summary of work which has been accomplished.

ANIMAL PRODUCTION.

[Man and animals], edited by H. KRAEMER (*Der Mensch und die Erde. Berlin, Leipsic, and Stuttgart, 1906, vols 1, pp. XII+500, pls. 44, figs. 173; 2, pp. XIII + 515, pls. 45, figs. 293*).—The first two volumes of this series consist of articles of a popular nature, written by different authors, on domesticated animals and on the value of wild and domesticated animals to agriculture, commerce, science, and medicine.

The Vienna institution for experimental biology, C. L. EDWARDS (*Pop. Sci. Mo., 78 (1911), No. 6, pp. 584–601, figs. 18*).—An outline of the work undertaken at this institution is given, together with a description of the equipment employed in caring for the animals used in studying variation, inheritance of functional adaptations, and other problems in heredity and biology.

The relation of biology to agriculture, F. R. MARSHALL (*Pop. Sci. Mo., 78 (1911), No. 6, pp. 539–553*).—An appreciation of the value to agriculture of various phases of biological research.

It is pointed out that aside from the field of economic entomology the studies of botanists have contributed more to agriculture than those of zoologists, and that the expectations of the more sanguine Mendelians have not been realized because they overlooked the fact "that we are not able to originate any specific character desired; that not all characters are transmitted in accordance with the Mendelian formula; and that, except for purposes of research, it is seldom practicable to breed for but one single or unit character at a time."

The measurement of natural selection, J. A. HARRIS (*Pop. Sci. Mo., 78 (1911), No. 6, pp. 521–538, figs. 7*).—This is written to show that natural selection, like artificial selection and other factors which may affect a change in type of animals and plants, is capable of direct measurement. The work already done along this line is summarized.

Pure lines in the study of genetics in lower organisms, H. S. JENNINGS (*Amer. Nat., 45 (1911), No. 530, pp. 79–89, dgm. 1*).—Concrete examples are given to illustrate the meaning of genotype. It is pointed out that in work in genetics, as well as in other fields of biology, a mixture of "unknown genotypes will always give confused and ambiguous results, whose significance no one can know. If, on the other hand we work with single genotypes, or with known combinations of them, we shall understand what our results mean."

The biometric proof of the pure line theory, J. A. HARRIS (*Amer. Nat., 45 (1911), No. 534, pp. 346–363*).—This paper presents the pure line theory as it appears to the biometrician, and indicates methods of work which seem necessary to the drawing of sound conclusions.

It is stated that the work of Pearl, previously noted (E. S. R., 24, p. 675), and of others can not be cited in support of the pure line theory or that selection in general is without effect, on the following grounds: (1) Characters which are not inherited at all can not be taken to prove that selection in general is ineffective; (2) improvement of any single character can not be supposed to be unlimited; (3) selection can not in general carry a character beyond a degree consistent with the optimum for maintenance and reproduction.

Biometric arguments regarding the genotype concept, R. PEARL (*Amer. Nat., 45 (1911), No. 537, pp. 561–566*).—A reply to criticisms noted above.

Male mitochondria in fertilized ovum, F. MEVES (*Anat. Anz., 36 (1910), No. 23–24, pp. 609–614; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 5, p. 557*).—Further evidence is offered in support of the author's view (E. S. R., 20, p. 1169) that chondriosomes represent a primitive and hereditary substance in the cytoplasm. They appear to be derived from both male and female germ cells.

The thymus and sexual organs.—III, Their relationship to the growth of the animal, D. N. Paton (*Jour. Physiol., 42 (1911), No. 4, pp. 267–282, fig. 1*).—The removal of the thymus retarded the growth of the testes in young guinea pigs, but not in those weighing above 300 gm. The simultaneous removal of the thymus and testes in very young guinea pigs checked the growth of the animals, but the removal of the testes or thymus alone had no effect upon the growth. Female guinea pigs deprived of the thymus at an early age became pregnant about the same time as normal animals. Ovariotomy and ovariotomy with thymus extraction appeared to exercise no effect on the rate of growth of the immature females.

These results indicate that in the guinea pig both the thymus and testes exercise an influence on the growth of immature animals, and that after the removal of one of these organs the other can compensate in part at least for the loss of the other.

On metallic coloring in birds and insects, A. A. Michelson (*Phil. Mag. and Jour. Sci., 21 (1911), No. 124, pp. 554–567*).—This is a study of the iridescent plumage of pigeons, peacocks, fowls, butterflies, and other animals caused by reflected light as distinguished from the colors due directly to pigments. In optical tests with polarized light measurements were made of the phase differences and amplitude ratios for various angles of incidence. The difficulty encountered by the absence of a true optical surface was met by replacing the objective collimator and of the observing telescope by low-power microscope objectives of small aperture.

The results indicate that the iridescence is due to an extremely thin film of some substances closely analogous in optical qualities to thin films of anilin dyes.

Experimental investigations on the inheritance of hyperdactylism of fowls.—III, Control experiments and experiments with common fowls, D. Barfurth (*Arch. Entwickl. Mech. Organ., 31 (1911), No. 3, pp. 479–511*).—Hyperdactylism in common fowls was found to be inherited independently of sex, as in the case of Orpingtons (E. S. R., 21, p. 572), and may remain latent over one generation. The author does not think hyperdactylism is inherited in Mendelian proportion.

Inheritance of fecundity in the domestic fowl, R. Pearl (*Amer. Nat., 45 (1911), No. 534, pp. 321–345, figs. 5*).—The purpose of this paper was to present figures sufficient to indicate with some degree of probability that egg production in fowls is inherited, and "probably inherited in accord with the genotype concept in spite of the fact that we do not and can not here have pure lines in the strict sense of Johannsen's definition."

The winter egg production of each generation of represented pedigrees showing high and low fecundity lines are presented in graphic form. The aim since 1907 has been to discover and propagate genotypes of high and low fecundity, and the effectiveness of the selection is shown in the following mean winter production with high fecundity lines: 1908–9, 54.16; 1909–10, 47.57; 1910–11, 50.58, as compared with 22.06, 25.05, and 17, respectively, for all low fecundity lines. Effectiveness of selection within the genotype was found to be without influence.

The differentiation of sex and the relation of the sex in chicks, E. Thomsen (*Arch. Entwickl. Mech. Organ., 31 (1911), No. 3, pp. 512–530, pls. 2*).—The sex of incubating chicks could be determined microscopically on the fifth day, and macroscopically on the ninth day. The secondary sexual characters were established before hatching. Of 805 chicks 385 were males.

A bibliography is appended.

The structure of the reproductive organs in the free-martin, with a theory of the significance of the abnormality, D. B. HART (*Proc. Roy. Soc. Edinb., 30 (1909-10), No. 3, pp. 230-241, pls. 2; Jour. Compar. Path. and Ther., 23 (1910), No. 3, pp. 193-205, figs. 5; also separate*).—The sex organs of hermaphrodites and sterile cattle are illustrated and described. There is also a further discussion of the significance of the free-martin (E. S. R., 22, p. 472).

"The free-martin is, according to Mendelian phraseology, a pure or extracted recessive quâ its genital determinants, and the potent twin a pure or extracted dominant, both of F^2 in the Mendelian scheme. Occasionally, but very rarely, as in three of Numan's cases, the recessive element is less complete."

A bibliography is appended.

The influence of castration on organisms.—IV, The conformation of castrated heifers, J. TANDLER and K. KELLER (*Arch. Entwickl. Mech. Organ., 31 (1910), No. 2, pp. 289-306, pl. 1, fig. 1*).—Measurements of desexed heifers show that in conformation they approach the type of a castrated male rather than that of a normal male. In this respect the results agree with those of the authors' previous studies of human beings. It is stated that desexing both males and females causes them to resemble an intermediate or asexual type rather than to assume the characteristics of the opposite sex.

Report of the animal industrialist, J. M. SCOTT (*Florida Sta. Rpt. 1910, pp. XIV-XVIII*).—As in earlier work (E. S. R, 23, p. 78) velvet beans in the pod were found to be a cheaper protein dairy feed than cottonseed meal. When the basal ration was wheat bran and Japanese cane silage the cost of milk with the former ration was 13.3 cts. per gallon, and with the latter ration 16.5 cts. per gallon. It is estimated that when cotton-seed meal is worth $1.60 per hundred, velvet beans in the pod are worth $1.58 per hundred for dairy cows. Velvet beans in the pod also require 30 per cent less roughage than when cottonseed meal is fed.

In a pig-feeding test 5 pigs on a ration of corn, Japanese cane, and velvet beans in the pod made an average daily gain in 51 days of 0.71 lb. per head at a cost of 8.6 cts. per pound.

In a steer-feeding experiment Shorthorns made an average daily gain in weight for the first year of 1.07 lbs., Herefords 0.97 lb., and the natives 1.095 lbs. per head.

Wintering young store cattle, J. L. DUNCAN (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1910), No. 1, pp. 142-146*).—Calves born in the autumn made faster gains during the winter when housed at night in a well-ventilated shed than did calves which received no shelter, but by midsummer there was little difference in the 2 lots. Wet weather had a more injurious effect on the unprotected cattle than did a protracted cold spell.

The practicability of supplying native beef to the army, G. E. NESOM (*Philippine Agr. Rev. [English Ed.], 4 (1911), No. 3, pp. 119-121*).—This contains statistics on the live stock in the different provinces of the Philippnes, which total nearly 250,000 head of cattle and nearly 750,000 head of water buffaloes. There are also data on the number of cattle slaughtered and on the amount of meat used by the army in the Philippines. It is pointed out that the Philippines are extensive importers of both live stock and meat products, but that the islands can become a great grazing country in the future, if the contagious diseases now menacing the industry can be controlled.

The native cattle of Finland (*Deut. Landw. Presse, 38 (1911), No. 31, pp. 370, 371, figs. 5*).—This is a review of a monograph by H. Nylander, which contains a history of cattle breeding in Finland and a description of the native breeds of cattle.

The history of the development of the different breeds of cattle in Bavaria, ATTINGER (*Deut. Landw. Tierzucht, 15 (1911), Nos. 19, pp. 221, 222; 20, pp. 233, 234*).—A historical account of improved methods of breeding, and of the influence of introduced breeds of cattle.

Feeding sheep and lambs: Clover hay v. native hay; turnips v. dry ration, T. R. ARKELL (*New Hampshire Sta. Bul. 152, pp. 3–19, figs. 6*).—This reports the results of feeding tests conducted during 1909–10 to test the relative feeding values for sheep of (1) clover hay *v.* the ordinary hay mixture of very variable composition and designated native hay, grown in New Hampshire, and (2) turnips in conjunction with grain and hay *v.* a dry ration of grain and hay.

In the first experiment 4 lots of sheep were used, five in each lot, 2 lots consisting of ewe lambs of the mutton breeds, and the others of 2 to 3-year-old ewes, either Rambouillets or the ordinary grade stock of New Hampshire. Both lots of lambs were fed an equal quantity of a mixture of corn, bran, and oats (equal parts by weight) and turnips. In addition one lot was fed clover hay, the other an equal quantity of native hay. With the aged ewes the same plan was followed with the hay, but they were fed only turnips besides. Analyses of all the feeds and digestion coefficients of the native hay are reported.

The lambs fed clover hay made an average daily gain of 0.351 lb. per lamb at a cost of 7.66 cts. per pound; those fed native hay, 0.229 lb. at a cost of 12.4 cts. The corresponding figures for the aged ewes were 0.184 lb. at a cost of 16.24 cts., and 0.065 lb. at a cost of 42.87 cts., respectively. The poor results with native hay were due to the fact that it contained large quantities of timothy and other grasses that the sheep did not relish. Farmers are advised to sell their timothy and native hay and purchase for their sheep clover or alfalfa hay.

In the second test 10 ewe lambs of the mutton breeds were divided into two lots. Lot 1 was fed grain (oats, bran, and corn in equal parts by weight) and clover hay; lot 2, the grain mixture, clover hay, and turnips. The amount of grain and clover hay given to lot 2 was so reduced that the cost of the ration would equal that of lot 1. Lot 1 made an average daily gain per lamb of 0.29 lb. at a cost of 11.96 cts. per pound; lot 2 a daily gain of 0.378 lb. at a cost of 9.60 cts. The results of this experiment were very striking. In every instance the turnip-fed lambs made decidedly better gains than those fed the dry ration. This was especially apparent toward the end of the test. The difference is attributed to a stagnation of the appetite of those fed the dry ration. "The turnip-fed lambs eagerly sought and would have eaten more."

The pig, F. FAELLI (*Il Porco. Milan, 1911, pp. 461; rev. in Vet. Jour., 67 (1911), No. 431, pp. 311, 312*).—A pioneer work on the breeds, breeding, feeding, and management of swine from the Italian point of view.

Is German meat meal a good feed for swine? M. POPP, W. FELLING and F. SCHÜTZE (*Deut. Landw. Presse, 38 (1911), Nos. 37, pp. 429, 430; 38, pp. 440, 441, figs. 4*).—Meat meal proved to have about the same value as fish meal when used as a supplement to barley and in mixed rations for swine. It was superior to a proprietary mixed feed or to a ration composed entirely of barley. Analyses of feeds and results of slaughter tests are given.

The conditions underlying the breeding of Percherons, and a comparison of their form with the Boulonnais and Belgian breeds based on official measurements, W. GOTZMANN (*Landw. Jahrb., 40 (1911), No. 1–2, pp. 1–81, pls. 3*).—This treats of the origin, characteristics, and geographic distribution of the Percherons. Measurements of 515 Percherons are presented in tabular form.

The single testing system of breeding for egg production, D. F. Laurie (*Jour. Dept. Agr. So. Aust., 14 (1911), No. 8, pp. 748–759, figs. 3*).—In order to detect good layers from which to breed, the author advocates the keeping of hens in single pens instead of using trap nests. Details are given for the management of the hens and the keeping of records when this system is used.

The Buckeye; one of the newer breeds, Mrs. Gertrude O. Earl and A. H. Weisberg (*Rel. Poultry Jour., 18 (1911), No. 4, pp. 596, 627, fig. 1*).—An account of the origin and characteristics of a new general utility breed of fowls.

The principles of ostrich feeding, J. E. Duerden (*Agr. Jour. Brit. East Africa, 3 (1910), No. 3, pp. 233–240*).—This article discusses wild and tame breeding stock, the characteristics of the perfect plume, selective breeding, and variability in progeny.

The influence of climate on oyster propagation at Barnegat, N. J., 1909, J. Nelson (*New Jersey Stas. Rpt. 1909, pp. 225–266, pls. 5*).—The factors influencing oyster propagation which were studied included temperature, rainfall, direction of winds and their force, the extent of the tides, and allied phenomena as they affect one another and as they are modified by local conditions, topography, character of the bottom, and situation of streams.

The range of the spawning season observed thus far extends from June 10 until October, but the principal periods are between June 14 and August 10. Both spawning and spatting occurred in climaxes which coincided with warm waves. The effect of such waves was to warm the water, especially on shallow flats. The temperature effect was greater in proportion to the difference between it and the temperature previously experienced. Hence it is that oysters taken from the warmer southern waters and planted in the colder northern waters fail to propagate although well filled with spawn, and that northern oysters taken into more southern regions will spawn earlier than the natives. A cold period followed by warm weather has a greater effect than if the contrast was less marked, and when a cool period succeeds a warm spell it has a chilling effect, even though the temperature is as high as that which in a reverse case would have stimulated spawning. It is stated that there are probably other causes, yet to be discovered, that supplement this influence of temperature.

It is unknown why spawn floats for weeks while growing to the spatting size and yet is not seen in the filtration of the water between the warm periods. "Particularly important is the discovery that the spawn emitted does not set as spat as early as has been hitherto believed by the best authorities. This discovery has two aspects, one of encouragement and one of discouragement. The encouraging side is that we can take advantage of the long period in which the fry is floating to get the cultch ready to plant at the very best time and not have to trust to luck. There is also hope of finding out other useful facts about the setting of spat. On the other hand, the discouraging feature that grows out of this discovery is that it will be more difficult to breed oysters artificially than we had hitherto hoped."

Observations and experimental data on spawning, fertilizing, salinity, and filtration are reported and summarized in tables and charts. An alleged oyster disease was investigated and found to be due to a deposit of mud, which settled in a depression whenever easterly winds prevailed in the spring for a considerable length of time. A floating laboratory for further study of oyster propagation is illustrated and described.

On the composition of forage plants, L. Goblet (*Jour. Soc. Agr. Brabant et Hainaut, 56 (1911), No. 22, pp. 271, 272*).—Analyses are reported of clover, alfalfa, and prairie hays.

Soy beans and their by-products, F. Honcamp (*Landw. Vers. Stat., 73 (1910), No. 4–5, pp. 241–284, figs. 2; abs. in Zentbl. Gesam. Physiol. u. Path.*

Stoffwechsels, n. ser., 6 (1911), No. 139, 140).—This deals with the chemical composition and the use of the soy bean and its by-products for feeding purposes.

The investigations of others on this subject are reviewed, and digestion experiments by the author are reported in which the coefficients of digestion in experiments with wethers were as follows: Soy-bean cake from which the oil had been removed by pressure, protein 92.8, fat 92.8, nitrogen-free extract 102.7, fiber 36.1 per cent; cake from which the oil had been extracted, protein 91.9, fat 67.6, nitrogen-free extract 105.4, fiber 99.3 per cent. Averaging these results with those obtained by other investigators it is estimated that in 100 lbs. of pressed soy-bean cake there are the following amounts of digestible nutrients: Protein 43.3, nitrogen 31.1, fat 6.9, fiber 4.4 lbs.; in the extracted cake, protein 48, nitrogen-free extract 34.6, fat 1.2, fiber 5.2 lbs.

A bibliography of the literature on the subject is appended.

Molasses and sugar foods for live stock, W. GOODWIN (*Jour. Bd. Agr. [London], 18 (1911), No. 2, pp. 97–106.*)—A summary of information on the value of molasses as a feed for live stock, based on the latest scientific investigations in different countries. The author warns stock feeders against paying a high price for molasses feeds when the absorbent material is peat or some other substance containing little or no nutritive material.

On oat-mill refuse feeds, N. HANSSON (*K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 1, pp. 80–83*).—Analyses of the various oat refuse feeds are given and their feeding value discussed. Attention is called to the varying composition of these feeds and to the necessity of obtaining guaranties for their maximum fiber contents, as well as for the minimum percentages of protein, fat, and carbohydrates which they contain.

Some condimental stock feeds (kraft-och hälsofoder), their composition and feeding value, N. HANSSON (*Meddel. Centralanst. Försöksv. Jordbruksomrádet, 1911, No. 41, pp. 16.*)—The results of chemical and microscopical examinations of proprietary stock feeds and one sample of concentrated feeding phosphate are given. Farmers are warned against purchasing feeding stuffs composed of unknown mixtures and sold at high prices under fancy names on account of their medicinal qualities. "Above all it is in order to suspect all preparations sold at much higher prices than our best concentrated feeding stuffs. There are no mixed feeds that can have an appreciably higher value than these for healthy animals."

Report of commercial feed stuffs, J. E. HALLIGAN (*Louisiana Stas. Feed Stuffs Rpt. 1909–10, pp. 120*).—Analyses are reported of 9,381 samples of cottonseed meal, cottonseed feed, corn chops, hominy feeds, brewers' grains, poultry feeds, alfalfa meal, molasses and other mixed feeds, and wheat, rice, and animal by-products.

Notice of judgment (*U. S. Dept. Agr., Notice of Judgment 868, pp. 2*).—This relates to the misbranding of proprietary feeds.

Public abattoirs: Their planning and the organization of their personnel, S. M. DODDINGTON) *Jour. Meat and Milk Hyg., 1 (1911), No. 5, pp. 266–274*).—A consideration of the essential factors which should govern the construction, equipment, and arrangement of public abattoirs.

Some modern abattoirs and abattoir methods, A. TRIMBLE (*Jour. Meat and Milk Hyg., 1 (1911), Nos. 2, pp. 98–109; 4, pp. 207–219, figs. 12*).—These articles contain the main facts of a report of a committee from Belfast, Ireland, which investigated the arrangement and equipment of slaughterhouses and methods of slaughtering as practiced in Rotterdam, Hamburg, Berlin, Dresden, Cologne, and Islington.

DAIRY FARMING—DAIRYING.

Annals of dairying in Europe.—Dairy husbandry from prehistoric times, L. M. Douglas (*Cream. Jour., 21 (1911), Nos. 23, pp. 1, 2, figs. 5; 24, pp. 1, 2, fig. 1; 22 (1911), Nos. 1, pp. 1, 2; 3, pp. 1, 2; 4, pp. 1, 2, fig. 1; 5, pp. 1, 2, figs. 6; 6, pp. 1, 10, 11, figs. 10; 7, p. 1; 8, pp. 12, 24, figs. 2; 9, pp. 4, 20, figs. 2*).—The history of dairying from its beginnings with the early Hebrews, Greeks, and Romans up to the time of the introduction of modern methods as practiced in European countries is briefly reviewed.

Farm dairying, Laura Rose (*Chicago, 1911, pp. XIV+298, pls. 29, figs. 37*).—A practical work which treats of dairy husbandry and the manufacture of butter and cheese.

Bulletin of the International Federation of Dairying (*Bul. Féd. Internat. Lait., 1911, No. 5, pp. 72, pls. 3*).—This contains information relating to the affairs of the International Dairy Federation and other matters of general interest to those interested in the production and sale of dairy products.

Cow fodder, P. McConnell (*Jour. New Zeal. Dept. Agr., 2 (1911), No. 4, pp. 212–214*).—A study of the value of Bhuda kale, thousand-headed kale, and rape, as compared with other feeds for tiding cows over the dry season in New Zealand.

The Bhuda kale was the first to show the effects of drought. Rape was the only one of the three to be affected by clubroot. All 3 fodders gave a very pronounced unpleasant flavor to both milk and butter. Bhuda kale gave the highest average milk yield, but, on the other hand, yielded a much less weight per acre. Considering the good and bad points of all 3 fodders, the thousand-headed kale ranked highest, as it yielded a high average amount of milk and resisted drought and attacks of parasites.

When a change was made in the ration from these fodders to corn fodder there was an increase in the daily average milk yield of 2¼ lbs. per cow, and the quality of the milk and flavor of the butter was improved. One acre of Japanese millet gave a yield of 22 tons of green fodder per acre, and on many farms it has taken the place of maize. Tares proved to be an excellent fodder, especially in the winter months.

A 4-year test of meadows, J. P. Beiler (*Deut. Landw. Tierzucht, 15 (1911), Nos. 15, pp. 173–175, fig. 1; 16, pp. 185, 168*).—In experiments with milch cows during the years 1905–1908, hay from fields fertilized with Thomas slag and kainit gave, even when the soil contained a good proportion of potash, larger yields and of superior chemical and botanical composition than hay which had received Thomas slag without kainit.

Milk production.—IV, Computing rations for dairy cows, O. F. Hunziker and O. E. Reed (*Indiana Sta. Circ. 26, pp. 21*).—This presents tables and data to encourage cow owners to give more attention to the feeding of their cows by being able to formulate rations.

Winter milk production, J. L. Duncan (*Dept. Agr. and Tech. Instr. Ireland Jour., 11 (1910), No. 1, pp. 132–141*).—A report of a 3-year experiment at the agricultural station of Clonakilty on the economics of winter dairying in the south of Ireland. The average yearly production per cow was 733 gal., at an average cost of 4½d. per gallon. The average fat content of the milk was 3.42 per cent.

[The college dairy herd], F. C. Minkler (*New Jersey Stas. Rpt. 1909, pp. 56–76, pls. 7*).—A general account is given of the management and records of the college dairy herd.

During the year ended November 30, 1908, the average yield of 24 cows was 8,857.7 lbs. of milk, containing 4.38 per cent of fat. The following year the average yield for 31 cows was 8,561.1 lbs. of milk, containing 4.26 per cent of fat. The average cost of the feed for each cow per day was 33.3 cts. and per quart of milk 3.04 cts. The total cost of milk, including labor, was 4.16 cts. per quart when based on the cost of growing the feed consumed and 4.8 cts. when based on market prices of feed.

Milk records of twelve different breeds of cattle (*Deut. Landw. Presse, 38 (1911), Nos. 36, pp. 418–420; 37, p. 431; 38, pp. 441, 442; 39, pp. 456, 457; 40, pp. 466, 467, figs. 36*).—This series of articles contains data of the milk production of 12 German breeds.

Further investigations on the influence of stimulating substances on milk secretion, G. Fingerling (*Landw. Vers. Stat., 74 (1911), No. 3–5, pp. 163–182*).—In continuation of earlier work (E. S. R., 22, p. 677), 3 goats were fed a mixture of appetizing foods composed of malt sprouts, starch, sesame cake, meadow hay, and salt. Larger yields were obtained with this ration than on a ration which contained the same amount of food material but consisting of less palatable foods, such as peanut oil, starch, gluten, feed lime, hay ash, and straw. When molasses was added to the latter ration the yield was increased, showing that the materials in the molasses have favorable effect on milk secretion outside of any digestible nutrients which they contain.

Analyses of feeds and feces and other data are included in the report.

Influence of watery feeds on the quantity and quality of milk, F. Tangl and A. Zaitschek (*Landw. Vers. Stat., 74 (1911), No. 3–5, pp. 183–249*).—In this investigation the rations of 10 cows were so changed from time to time as to contrast succulent feeds, or those containing a large percentage of water, such as pumpkins, roots, potatoes, and corn distillery slop, with a dry feed like alfalfa. Hay, barley, maize, and rape cake were fed to all groups, and in some cases straw and clover bran.

Taking the results as a whole, neither succulent rations nor the increased consumption of water had any effect on the yield or the composition of the milk. Generally a change to distillery slop, roots, or alfalfa increased the yield, whereas there was a slight decrease caused by potatoes and a large decrease by pumpkins. A much smaller amount of water was drunk during the slop and pumpkin period than at other times.

It is concluded that the yield of milk is dependent upon the quality of the feed, as well as upon its starch value.

Analyses of milk and feeding stuffs are presented in tabular form.

On the influence of feeding stuffs on the composition of milk fat, A. Zaitschek (*Landw. Vers. Stat., 74 (1911), No. 3–5, pp. 250–262*).—As a result of a study made of the effect of the rations used in the above experiments on the nature of the milk fat, the following conclusions are drawn:

A ration consisting of feeds which have a high iodin number, such as maize, barley, bran, and rapeseed cake, causes a rise in the iodin number of the milk fat, but the Köttsdorf and Reichert-Meissl numbers are lowered. Roots and potatoes increased the volatile fatty acids in milk fat as compared with maize and rapeseed cake. Although the fat in the feeds influenced the composition of milk fat, rations composed of quite different feeding stuffs can produce the same amount of milk fat. Toward the end of the lactation period the saponification, and Reichert-Meissl numbers of the milk fat were lowered, while there was a rise in the iodin number, the refractive index, and the melting point. After a change in feed the saponification and iodin numbers of the milk fat were quicker to change than the Reichert-Meissl number.

The relation between the fat of milk and the colostrum to the fat of the food and the body of the mother and embryo, A. Bode (*Über die Beziehungen zwischen den Fetten der Milch und des Kolostrums zu den Fetten der Nahrung,* *des mütterlichen und des kindlichen Körpers. Inaug. Diss., Univ. Bern, 1909, pp. 45*).—Analytical constants are reported of (1) the body fat of the fetus and young of man and domesticated animals, (2) the fat in milk and colostrum, and (3) milk fat as affected by age, breed, and feed. The properties of colostrum fat were found to lie between those of milk fat and body fat.

A bibliography is appended.

On the nature of the cellular elements present in milk.—III, The milk of animals other than the cows, R. T. HEWLETT, S. VILLAR and C. REVIS (*Jour. Hyg. [Cambridge], 11 (1911), No. 1, pp. 97–104; Jour. Brit. Dairy Farmers' Assoc., 25 (1911), pp. 69–75*).—In continuation of earlier work (E. S. R., 23, p. 580), cellular counts were made of the milk of the ass and goat, and of human milk.

The general conclusion from this and the previous work is that a uniform type of life evidently tends to a fairly uniform excretion of tissue cells from the udder. Outside causes may temporarily increase this excretion, and high counts are not necessarily connected with any diseased or disordered condition of the mammary gland. When the cell count is high for any reason, the cells themselves are always well defined, showing little signs of degeneration, and also stain in a much more characteristic and definite manner, a fact which is difficult to explain if they are to be considered as blood elements.

Contributions to the question as to whether ingested copper is secreted in the milk, C. TITZE and W. WEDEMANN (*Arb. K. Gsndhtsamt., 38 (1911), No. 1, pp. 125–136*).—Solutions of copper sulphate and leaves on which copper mixtures had been sprayed were given to 2 milch goats. The milk was found to be free from copper except in two instances, where a slight trace was found. Copper and copper sulphate was constantly found present in the urine and excreta. Slaughter tests showed considerable copper in the liver and small amounts were present in the kidneys, blood, and heart, with traces in other organs. No trace of copper was found in the udder, muscles, or fatty tissues.

Scarlet fever in relation to cow's milk, W. HUNTING (*Vet. Jour., 67 (1911), No. 431, pp. 259–268*).—From a critical analysis of the evidence where milk-borne outbreaks of scarlet fever have been reported, the author concludes that none of the reported cases have as yet been proved to be of bovine origin, although it is probable that the disease may be carried by milk when contaminated through a human source.

Publicity and payment based on quality as factors in improving a city milk supply, H. A. HARDING (*New York State Sta. Bul. 337, pp. 79–114, chart 1*).—This records the result of a study of the influence upon the milk supply of Geneva, N. Y., of publicity regarding the sanitary conditions under which the milk was produced and of payment to the producer on the basis of the quality of the product.

The method employed was to score each dairy quarterly upon the basis of the sanitary conditions under which the milk was being produced, to furnish this score to the producer and retailer so that it could be made the basis of payment under their contracts, and to publish the score of all of the producers, with the names of their retailers, so that the consuming public could purchase intelligently. In comparing dairies conditions were reduced to a numerical basis by means of a score card, an outline of which is given. The dairies were classified under the following heads: Poor, where filthy conditions were present; medium, where conditions were merely dirty; good, where the conditions were fairly clean; and excellent, where they were both clean and sanitary.

"There is every reason for thinking that the sanitary conditions of this city supply at the beginning of this study were as good as the average of the cities of the State. A careful initial inspection showed that 37.5 per cent of the dairies were 'poor,' 57.5 per cent 'medium,' and 5 per cent 'good.'

"At the end of one year 2.9 per cent of the dairies ranked as 'excellent,' 58.9 per cent as 'good,' and 38.2 per cent as 'medium.'

"At the end of the second year 8.6 per cent of the dairies ranked as 'excellent,' 82.8 per cent as 'good,' and 8.6 per cent as 'medium.'

"At the end of the third year 12.8 per cent of the dairies ranked as 'excellent,' 74.4 per cent as 'good,' and 12.8 per cent as 'medium.'

"At the end of the first quarter of the fourth year 12.8 per cent of the dairies ranked as 'excellent' and 87.2 per cent as 'good,' the 'medium' grade having finally disappeared.

"While a lack of cooperation between the health authorities and the milkmen is ordinarily the factor which retards improvement in city milk supplies, the limit of improvement is set by the disinclination of the consumer to pay a fair price for the labor and expense necessary in the production and sale of clean milk."

A method is suggested for encouraging dairymen to have their cows tuberculin tested.

How a small city improved its milk supply, F. H. Hall (*New York State Sta. Bul. 337, popular ed., pp. 3-11*).—A popular edition of the above.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 847, 867, p. 1 each*).—These relate to the adulteration of milk.

Cheddar cheese, W. W. Jenks et al. (*N. Y. Produce Rev. and Amer. Cream., 31 (1911), No. 25, pp. 898, 899*).—A symposium as to the definition of the term Cheddar cheese.

Note on Gorgonzola cheese, E. Hinks (*Analyst, 36 (1911), No. 419, pp. 61–63*).—Analyses of Gorgonzola cheese are reported. The average composition of 8 samples of the rind when coated with barytes was as follows: Barytes 83.6 per cent, fat 15.6 per cent, and moisture 0.8 per cent. The methods of making the cheese and applying the coat of barytes are described.

Studies on sheep dairying, A. Burr and F. M. Berberich (*Milch Ztg., 40 (1911), Nos. 13, pp. 125–127; 14, pp. 135–137; 15, pp. 145–147; 20, pp. 195–198; 21, pp. 205-208*).—A continuation of earlier work (E. S. R., 25, p. 176). Methods of manufacturing different kinds of cheese are described, and analyses of cheese are reported.

Testing of new dairy apparatus at Leipsic, 1909, B. Martiny (*Arb. Deut. Landw. Gesell., 1910, No. 172, pp. 151, figs. 26*).—Besides descriptions of various kinds of dairy apparatus, trials of the Revalo milking machine and of hand separators are reported.

VETERINARY MEDICINE.

General microbiology, W. Kruse (*Allgemeine Mikrobiologie. Leipsic, 1910, pp. XV+1184*).—This work has to do with the study of matter and energy exchange of the minute organisms, and has been prepared especially for the use of physicians and naturalists. It contains among its chapters the following subjects: The structure, microchemical behavior, and nutrients of micro-organisms; chemical composition of micro-organisms; metabolic processes in micro-organisms; changes wrought by micro-organisms with carbohydrates, alcohols, fats, fatty acids, glucosids, aromatic bodies, proteins, simple nitrogenous bodies, and sulphur and other inorganic substances. The book further considers the channels of oxygen and their relation to the matter and energy exchange, ferments, coloring matters, poisons (endo-, ecto-, immuno-, tetanus, paratyphoid, erysipelas, anthrax, streptococcus, meningococcus, pyocyaneus, tuberculosis, glanders, ray fungus, mold fungi, and protozoan toxins), hemolysins, hemoglobins, leucocidins, and aggressins.

The work ends with a chapter on the transformability of micro-organisms.

The Ehrlich-Hata preparation 606, R. Lüders (*Ztschr. Offentl. Chem., 17 (1911), No. 4, pp. 64–70*).—This is a detailed discussion in regard to this preparation and its position in the field of chemotherapy.

Meat poisoning caused by Proteus vulgaris, G. Mazzini (*Abs. in Bul. Inst. Pasteur, 9 (1911), No. 4, p. 185*).—The author considers the poisoning of some 100 individuals following the consumption of sausages made of pork and beef to have been due to *P. vulgaris*.

Vaccination against symptomatic anthrax, M. Somogyi (*Állatorvosi Lapok, 32 (1909, No. 40, pp. 485, 486; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 11, p. 193*).—During the last few years in the vicinity where the author is active, floods were frequent and following them cases of blackleg have always occurred. The author has attempted to reduce the mortality from the disease by protective vaccination.

In all, nearly 1,500 animals were vaccinated, at first with the vaccine (muscle product) from the Royal Bacteriological Laboratory, and later from the Pasteur-Chamberland Institute. At the outset with the first vaccine everything was satisfactory. Very few animals died from 3 to 4 days after the vaccination. With the second and later vaccinations it was noted that at the site of the vaccination a large swelling always occurred, and the number of deaths became very frequent. This prompted the author to return to the Royal Bacteriological Institute's vaccine, and with which very few deaths occurred.

Vaccinating against anthrax, J. Schnürer (*Tierarztl. Zentbl., 33 (1910), No. 27, pp. 424, 425; abs. in Berlin. Tierarztl. Wchnschr., 27 (1911), No. 11, p. 193*).—A description of cases of anthrax in horses and bovines which were vaccinated according to Sobernheim, with anthrax serum (Jenner-Pasteur and Pasteur-Chamberland, both from Budapest), and according to Pasteur (Vaccine I and II). The results obtained were in most instances good.

Foot-and-mouth disease during 1910, Nevermann (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 11, pp. 185–189*).—This is a discussion in regard to the occurrence and extent of foot-and-mouth disease in Germany, especially East Germany, during 1910. A comparison is made with Austria-Hungary.

The precipitation reaction for glanders and its practical diagnostic significance, F. Stolipin (*Die Präzipitation beim Rotz und ihre praktischdiagnostische Bedeutung. Inaug. Diss., Dorpat, 1910; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 9, p. 899*).—The experiments, which were conducted with horses, cats, rabbits, and guinea pigs (the serum of the last 3 being examined before and after the injection with the precipitation layer test), showed that only animals having the disease yield a specific positive ring test. A positive test was obtained in the case of the cats and guinea pigs 4 days after the infection.

As the precipitinogen reagents the author utilized mallein and extracts of 3-day-old *Bacillus mallei*. Bouillon cultures yielded (with and without glycerin) more potent extracts than agar cultures. See also previous notes (E. S. R., 20, p. 385; 24, p. 481; 25, p. 181).

In regard to utilizing passive anaphylaxis for diagnosing glanders, A. Wladimiroff (*St. Petersb. Med. Wchnschr., 35 (1910), No. 45, pp. 608, 609; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 9, p. 902*).—The author concludes that passive anaphylaxis can not be employed for diagnosing glanders.

The significance and specificity of Lentz's bodies in rabies, F. Keysser (*Abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 48 (1910), No. 8, pp. 235, 236*).—

After describing the findings of various investigators in regard to Lentz's bodies (E. S. R., 22, p. 283), the author states that as a result of his investigations he finds that the views of Lentz in regard to the specificity of the bodies isolated by him are correct.

The mortality and the incubation period of rabies in man, S. Kozewaloff (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 57* (*1911*), *No. 5, pp. 893–397*).—This paper analyzes the results obtained at the antirabies station at Charkow, Russia, extending over a period of 21 years (1888 to 1908) with 25,608 persons, 24,051 of which were bitten, while the remainder came in contact with rabid animals in some way or other.

The chief disseminators of the virus were dogs (90.6 per cent), cats (6.1 per cent), and wolves (1.2 per cent), the remaining animals mentioned being horses, bovines, pigs, etc. Of the persons bitten and treated 260 died, and of these 161 died 15 days after the final injection was made. The greatest percentage died as a result of the wolf bite, while no deaths were due to the bites of the bovine, horse, pig, etc. The localities bitten were highest for the upper extremities and least for the trunk. The period of incubation was studied in 212 fatal cases, and in most instances (40.6 per cent) this was found to vary from 20 to 40 days. A minimum of 12 days was found in a 3-year-old girl and a maximum with 8 cases of over 200 days.

The effect of vacuum desiccation upon the virus of rabies, with remarks upon a new method, D. L. Harris and L. F. Shackell (*Jour. Amer. Pub. Health Assoc., 1* (*1911*), *No. 1, pp. 52, 53*).—The method used was as follows:

The material to be dried was placed in the bottom of a Schueibler's vacuum desiccating jar, in the upper part of which was a separate dish containing H_2SO_4; the temperature was reduced by placing the jar, half submerged, in a salt and ice mixture, and after thorough solidification of the material had resulted, a rapid vacuum was produced by a Geryk pump to less than 2 mm. of mercury. During the process of desiccation, the temperature in the lower half is kept several degrees below 0° C. Unless the H_2SO_4 be repeatedly shaken to prevent surface saturation with water, the time required for complete desiccation will be unduly prolonged.

The authors found that "by using Shackell's method of desiccation, brains and cords may be desiccated in toto without destruction of virulence. The time required for the complete extraction of water is about 24 to 36 hours. A number of brains have been so treated and the infectivity of all has been preserved. After the completion of desiccation, the brains are placed in an ordinary desiccating jar over H_2SO_4 and left continually exposed to light at the ordinary room temperature."

Investigations in regard to the infectiousness of street virus for white mice when injected subcutaneously, S. Kozewaloff (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 57* (*1911*), *No. 5, pp. 397–402*).—These investigations were made with street virus and virus fixe, and tend to show that white mice are receptive subcutaneously for street virus, but that this method is not so good as the classical, subdural infection of rabbits.

The life history of Trypanosoma gambiense and T. rhodesiense as seen in rats and guinea pigs, H. B. Fantham (*Proc. Roy. Soc.* [*London*], *Ser. B, 83* (*1911*), *No. B 563, pp. 212–227, pl. 1*).—"Nonflagellate stages of trypanosomes, such as *T. gambiense* and *T. rhodesiense* occur. These nonflagellate stages ('latent bodies' of Moore and Breinl) are especially found in the lungs, spleen, and bone marrow during periods of decrease of trypanosomes in the peripheral blood of the host. They are in process of formation at or near the time when the trypanosomes are most numerous in the peripheral blood. The formation of latent bodies takes place especially in the lungs, and they collect in the spleen and bone marrow of the host. In the formation of nonflagellate stages, some of the cytoplasm and the flagellum of the trypanosome are disintegrated. The nonflagellate body contains the nucleus and blepharoplast (kinetonucleus) of the trypanosome. Nonflagellate (latent) bodies can be seen to grow and flagellate, turning into trypanosomes, when placed in fresh, warm, uninfected blood. Latent bodies of *T. rhodesiense*, inoculated into a rat, flagellate and produce trypanosomiasis. The nonflagellate (latent) bodies of trypanosomes (*T. gambiense* and *T. rhodesiense*) are the postflagellate stages of one generation of trypanosomes and the preflagellate stages of the succeeding generation of trypanosomes. There is a life cycle of trypanosomes (*T. gambiense* and *T. rhodesiense*) in vertebrate hosts, comparable with those of Crithidia and Herpetomonas in the alimentary tracts of various invertebrates. The latent (relatively resistant) stages of trypanosomes occurring in vertebrates are separate from, and in addition to, stages of the parasite which may occur in the invertebrate carrier (for example, Glossina)."

Results obtained from the inoculation of dogs with the horse-sickness virus, P. and E. KUHN (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 8 (1911), No. 5–6, pp. 665–739*).—The authors find that horse sickness can be transmitted to dogs through ingestion of the virus. They think that the native jackal, a related species of Canis, may be found to be a carrier of the virus.

Notes on the bovine plasmoses of Southern Rhodesia, L. E. W. BEVAN (*Rhodesia Agr. Jour., 8 (1910), No. 1, pp. 74–81*).—The author concludes that "young cattle bred in Mashonaland, while themselves tolerant or immune, harbor in their blood at least 2 species of protozoa, namely, *Piroplasma bigeminum* and *Anaplasma marginale*. Blood taken from them and inoculated into susceptible animals gives rise to 2 infections. That caused by *P. bigeminum* occurs first, and that caused by *A. marginale* follows at a time when the subject is weakened by the *bigeminum* infection. Great care is necessary in the selection of blood for inoculation purposes. The constitution and breed of the animal supplying the blood, its origin, and the approximate degree of infection to which it has been submitted since birth, must be taken into consideration, but it is possible to find a blood in which the parasites are attenuated or of sufficiently low pathogenicity to produce an infection which can be regulated.

"The process of immunizing can not be conducted on mechanical lines, but each case must be treated 'on its merits.' The individual resistance of the animal to be inoculated bears an important part. When undergoing the process of inoculation the animal must be kept free from ticks; and even when immunized, a gross infestation by ticks is to be avoided, as the immunity is likely to break down under severe infection. The process of immunizing involves a severe strain on the animal's system, and checks development. Some of the drugs regarded as specifics against *P. bigeminum* are not specific against allied parasites."

In regard to differentiating the tubercle bacilli from various sources with the aid of bile containing nutrient media, P. MEYER (*Über die Differenzierung der Tuberkelbazillen verschiedener Herkunft auf gallehaltigen Nährböden. Inaug. Diss., Giessen, 1910, pp. 38; abs. in Ztschr. Tuberkulose, 17 (1911), No. 2, p. 184*).—The bile of the human being, bovine, dog, fowl, pig, and sheep in ordinary media in most instances partially inhibits the growth of the tubercle bacillus from bovine, human, and avian sources. The inhibition varies with the source of the bile, and particularly when the bile of one animal species is employed for cultivating the tubercle bacillus obtained from another animal species.

In regard to combating bovine tuberculosis, M. KLIMMER (*Schweiz. Arch. Tierheilk., 52 (1910), No. 6, pp. 382–406, fig. 2; abs. in Ztschr. Immunitätsf. u.*

Expt. Ther., II, Ref., 3 (1910), No. 13, p. 1099).—The author in this article recommends the use of antiphymatol for vaccinating against tuberculosis. The active principle of this preparation is obtained from human tubercle bacilli which have been prepared by passing them through cold-blooded animals and subjecting them to low temperatures, as a result of which the bacteria lose their infectious characters. The bacteria so prepared, according to the author, do not multiply when introduced into the system. He points out the limitations of this preparation and of its use as a curative agent.

Antiphymatol (Klimmer) and Klimmer's segregation method, E. HAUPTMANN (*Tierärztl. Zentbl., 33 (1910), Nos. 34, pp. 544–550; 35, pp. 559–564; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 13, pp. 1095, 1096*).—These tests extended over a period of 2 years and were made with 125 bovines, among which, before segregation, 70 per cent gave a positive (phymatin-human) ophthalmic reaction.

Among the 30 animals which at the outset did not react toward phymatin, and which were vaccinated twice the first year and once the following year with antiphymatol, 5 after from 1½ to 2 years were found to be sound on slaughter, despite the fact that during the interval the animals were kept in a barn containing diseased animals, some having open tuberculosis. The remaining healthy animals were not affected in the least by the vaccination, with the exception that the yield of milk on the day of the vaccination was decreased an average of 2 liters per head. No hygienic precautions other than the injection were taken with the animals.

Out of 79 animals which gave a positive ophthalmic reaction, 26, among the number 3 clinical cases and 2 emaciated "coughers," were injected 4 times during the first year with antiphymatol in order to determine its curative action. Two of the clinical cases were slaughtered after the second injection and showed widely distributed inflammation of the pleura. The 2 "coughers" which were injected 4 times were found on slaughter to be markedly tuberculous. A clinical case is still living and is in a good constitutional condition. The other clinical case after slaughter and after a period of 1½ years showed capsulated foci. In 7 clinically sound cases ¾ of a year after the close of the work the same capsulated foci were found after slaughter. The author believes that heavy feeding aided the curative action of this vaccine to a considerable extent.

The remaining 53 reacting animals were injected twice. Five were slaughtered, and 4 of these showed calcified foci, while the fifth was macroscopically free from tuberculosis. Thirteen of the living animals are in very good shape, while the remainder are in a fair state of preservation.

Diseases of the cow (excluding tuberculosis) affecting the milk in their relationship to human diseases, W. G. SAVAGE (*Jour. Meat and Milk Hyg., 1 (1911), Nos. 4, pp. 175–191; 5, pp. 231–244*).—This article discusses the various nontubercular diseases occurring in cows, such as anthrax, Gaertner infections, gastro-enteritis, Malta fever, mastitis, ulcerated teats, and sore throat, with particular reference to their relation to the production of disease in man by way of the milk from such animals.

A number of outbreaks are cited which had their origin from the cow.

Researches on the etiology of cachexia aquosa of ruminants.—The rôle of worms in gastro-intestinal strongylosis of sheep, CUILLÉ, MAROTEL, and PANISSET (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 14, pp. 567, 568*).—The authors have determined that the disease known as cachexia aquosa, which seriously affected ruminants during 1910, is not entirely dependent upon the presence of the liver fluke. In all the cachectic animals examined numerous helminths, etc., of various species were found, including a new strongylid species discovered in the abomasum.

The intermediate host of the liver fluke, Distoma (Fasciola) hepaticum, in South Africa, J. D. F. GILCHRIST (*Agr. Jour. Cape Good Hope, 37 (1910), No. 6, pp. 658, 659, fig. 1; Vet. Jour., 67 (1911), No. 430, pp. 249, 250*).—The snail *Physa tropica* has been found by the author to be the intermediate host of the liver fluke in Cape Colony.

In regard to the causative agent of hog cholera, RÜTHER (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 11, pp. 191, 192*).—A review of the more recent literature.

Protective vaccination against hog cholera, D. SZABÓ (*Állatorvosi Lapok, 33 (1910), No. 1, pp. 4, 5; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 11, p. 194*).—After separating the sick hogs, the remainder, with the exception of 30, were treated with Hutyra's vaccine (20 cc. of defibrinated blood). Of the 30 hogs not sick and not vaccinated 60 per cent died, of the 109 vaccinated but not sick animals only 13.8 per cent, and of the 26 sick and vaccinated animals 84.6 per cent.

Tests with Suptol-Burow, I. WEISS (*Állatorvosi Lapok, 33 (1910), No. 16, pp. 183, 184; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 11, p. 193*).—Suptol-Burow was found to be without value in cases of either pure septicemia or mixed infection, whether as a protective or as an agent for conferring permanent immunity against swine plague. See also a note by Tillmann (E. S. R., 24, p. 485).

The occurrence of the ox warble in the brain of a horse, P. GRINSTED (*Maanedskr. Dyrlæger, 22 (1910), No. 14, pp. 305–308; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 9, p. 153*).—The author reports a case in which at post-mortem a larva of *Hypoderma bovis*, 12 mm. in length, was taken from the right temporal lobe.

Treatment of canine distemper with Deutschmann's antistreptococcic serum and with permanent yeast (Antigourmine), F. LAMCHE (*Vorbeugung und Behandlung der Hundestaupe mit Deutschmann's Antistreptokkenserum und mit der Dauerhefe "Antigourmine." Inaug. Diss., Zürich, 1909; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 11, pp. 193, 194*).—This discusses the preparation of Deutschmann's polyvalent antistreptococcic serum from yeast, and of Antigourmine, which is a permanent yeast preparation.

The results with the polyvalent serum show that the serum can be used without danger for a long period of time, but that it is of no value for diseases of the digestive tract, even when these occur as complications of the lung affections. It has a favorable effect upon cases of distemper-pneumonia. The inflammations of the lung heal quicker and better under the influence of the serum, and inflamed corneas and corneal ulcers are either checked in their development or are stimulated to rapid healing. The course of the distemper pustules is not affected.

Antigourmine was found to be absolutely inactive as a prophylactic or as a therapeutic agent against distemper.

Fowl diphtheria and fowl pox, I. RÁTZ (*Állatorvosi Lapok, 33 (1910), No. 16, pp. 184–186, figs. 2; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 12, pp. 208, 209*).—These investigations verify the assumption that fowl diphtheria and pox (gregarinosis) are produced by the same filterable virus. By transferring the diphtheric membrane to sound animals the author was able to produce changes which simulated those characteristic of fowl pox, and with the virus of fowl pox he produced characteristic diphtheric lesions.

Experimental contribution in regard to the identity of fowl cholera and fowl pox, H. Sigwart (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 56 (1910), No. 5–6, pp. 428–464; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 12, p. 208*).—The cases examined came from various parts of South Germany. Experimental tests were made with sound birds from ½ to 1 year old, and with pathologic material (pocks, pock scabs, diphtheric membranes, nasal and tracheal secretions, and blood which was obtained under sterile conditions) rubbed up in physiological salt solution.

The results show that fowl pox can occur as a pure skin disease, or it can simply attack the mucus membranes of the head. The disease may also be present in both regions at the same time. The chronic cases without mucus membrane involvement were found to be in most instances mild forms of the disease.

Inoculation tests showed that when the infection is made on the comb the disease assumes the chronic membranous form of the head, but as infection does not always take place the author points out that this fact must not be considered a proof of the occurrence of idiopathic cases. Infection is not always possible with the liver and blood from chronic cases of the disease, and where infection did occur the disease usually ran a mild course.

After infecting intravenously with the pox virus in most instances no dermal changes took place. The only parts affected were the mucus membranes of the head, and this was irrespective of whether the infecting virus came from the skin form of the disease or from the membranous form. More positive results were obtained with the filtered pox or membrane virus, but in most instances the disease ran a mild course.

From the immunity tests it could be noted that a pure case of the disease can confer absolute immunity against infection cutaneously, per comb, face, and wattles. The duration and degree of immunity are relative to the degree of the disease. Mild forms of the disease do not always confer immunity.

In regard to protective vaccination against fowl cholera, K. Kovárzik (*Állatorvosi Lapok, 33 (1910), No. 32, pp. 375–380; abs. in Berlin, Tierärztl. Wchnschr., 27 (1911), No. 11, p. 194*).—During the year 1909 from 50 to 90 per cent of the fowls of the district under observation were affected with fowl cholera. In some of the pens from 8 to 13 per cent of the birds were immune. The author made tests with Galloserin, and found that the vaccinated animals became immune in from 2 to 5 months. No favorable results were obtained with animals already diseased. The procedure is considered too expensive for ordinary practice.

In regard to a new fowl disease in Europe.—Apoplectic septicemia in fowls, H. Magnusson (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 56 (1910), No. 5–6, pp. 411–428, figs. 5; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 12, p. 209*).—A study in regard to a disease which has been rarely observed and which is caused by a streptococcus. This organism could not be differentiated from the usual pathogenic streptococcus, and according to the author the disease is due to a casual increase in the virulency of this streptococcus, which usually inhabits the intestinal tract of fowls, but where it is mostly latent.

RURAL ENGINEERING.

Elements of agricultural technology, C. A. Vogler et al. (*Grundlehren der Kulturtechnik. Berlin, 1909, 4. ed., vol. 1, pts. 1, pp. XIX+539, pls. 3, figs. 205; 2, pp. X+804, pls. 6, figs. 707*).—This handbook is designed particularly for the use of the agricultural engineer, and summarizes a large amount of available data. Part 1 is devoted to the more general scientific phases of the subject, and especially to soil formation, agricultural botany, and the principles of mechanics and hydraulics. Part 2 discusses specific engineering problems, including roads, irrigation, drainage, moor culture, and land surveying.

Irrigation in Arizona, R. H. FORBES (*U. S. Dept. Agr., Office Expt. Stas. Bul. 235, pp. 83, pls. 4, figs. 8*).—This is one of the series of reports prepared in this Office for the purpose of giving general information regarding the opportunities for settlement on irrigated lands in the several Western States and Territories, the cost of land and water and of establishing homes on these lands, and regarding the crops grown. It discusses the history of irrigation development in Arizona, the area and topography, flora, industries, valuations, and population of the Territory, its climate, crops, markets, lands, and water resources, the laws and usages relating to irrigation, existing irrigation enterprises, and agricultural practice, and the agricultural present and future.

The water supply of Arizona available for irrigation purposes is estimated at from four to five million acre-feet a year, or sufficient for from 800,000 to 1,000,000 acres, whereas it is estimated that in 1909 but 227,770 acres was actually cultivated. "Five times the present area of doubly productive land will yield an annual product worth $90,000,000, which, with a possible output of $20,000,000 annually from grazing ranges, would give a total for the agricultural industries of over $100,000,000 annually. This is well in excess of the mining output of the Territory at the present time and suggests the possibility that finally in Arizona, as in the once mining States of California and Colorado, agriculture will become the leading industry."

Irrigation in California, F. W. ROEDING (*U. S. Dept. Agr., Office Expt. Stas. Bul. 237, pp. 62, pl. 1, figs. 17*).—This is another of the series of reports dealing with irrigation in the arid States and Territories, and has been prepared by this Office in cooperation with the State of California for the purpose of answering inquiries regarding conditions and the opportunities and cost of settlement.

Following a general discussion of the climate, population, industries, assessed valuation, and transportation facilities of the State, the water resources, lands, and products are discussed in detail, together with the history of irrigation development, water laws, various irrigation enterprises, and the cost of preparing land for irrigation.

The area of irrigable lands in California under present systems is computed to be 3,876,000 acres, of which about 2,500,000 are being actually irrigated. "With better laws to control and regulate diversions from the streams of the State, and therefore a guaranty for the safe investment of capital in irrigation enterprises without expensive litigations which have been incident heretofore with appropriations from the natural water courses, the State can expect a much larger population throughout the agricultural districts and a great addition to its wealth."

The use of underground water for irrigation at Pomona, Cal., C. E. TAIT (*U. S. Dept. Agr., Office Expt. Stas. Bul. 236, pp. 99, pls. 5, figs. 8*).—The work upon which this report is based was done in cooperation between this Office and the State of California.

"The Pomona Valley is typical of localities in the citrus belt of southern California, where water has a high agricultural value, but can be secured only at high cost. Much of the water is pumped, and there is no other section where water is used more economically or where greater effort is made to improve methods of development, distribution, and application. This report describes the problems confronting the irrigators, the methods employed, and the progress made in the economical use of the water resources."

Data are presented as to the duty of water for various crops, showing the use of from 0.8 to 0.82 ft. for citrus fruits, 0.45 ft. for deciduous fruits and diversified crops, and from 2.3 to 2.4 ft. for alfalfa. The cost of irrigation under prevailing methods is computed to be $24 per acre for oranges and $35 per acre for alfalfa.

It is maintained that the quantity of water being used is closely approaching the limit of the available supply, though some improvement is possible through conservation as well as by the construction of storage works. "But there must be an end to such works, and the extreme measures taken emphasize the fact of the scarcity of water to be had in large quantities. About 250,000 acres are now irrigated in the coast region of southern California. Work now progressing and other possible developments may add another 150,000, but finally the only possible further increase must come from a more economical use of the water available. Little improvement can be made over the best systems now in use in the transmission of the water from its source to its point of use. The greatest opportunity for saving is in a more economical application of the water to the land, and, moreover, whatever may be saved is as useful in the development of additional territory as the same amount of water from new sources, and it may be cheaper."

Irrigation in the San Joaquin Valley, California, V. M. CONE (*U. S. Dept. Agr., Office Expt. Stas. Bul. 239, pp. 62, pl. 1, figs. 15*).—This bulletin reports cooperative work between this Office and the State of California.

"The San Joaquin Valley includes nearly half the valley lands of California, and is noted for its productivity and adaptability to a wide range of crops. Irrigation, however, is necessary throughout the greater part of the valley to bring about the highest development. This report shows the possibilities and advantages of irrigation and the cost of water."

Data are given as to the climate, soils, water resources, population, transportation facilities, and agricultural and horticultural development of the valley, with details as to the streams and the lands irrigated by them. About 4,800,000 of the 7,360,000 acres in the floor of the valley are irrigable. Agricultural development is, however, handicapped by lack of state control of the water resources and the prevalence of wasteful methods and much litigation. "Wasteful methods have resulted in waterlogging large portions of the older irrigated sections, and but little effort has been extended toward restoring them to their former state of productiveness. Drainage, therefore, is emphatically needed and should go hand in hand with irrigation as a prevention and cure for such damage. . . .

"The San Joaquin Valley has made a great growth. The acreage under irrigation is increasing each year, and in the irrigated sections there is apparent progress and prosperity. A large acreage is being planted to vines and trees and other permanent crops, and much care and intelligence are shown in the work. The natural advantages of the valley will insure its continued progress, but it can not reach the development of which it is possible and provide homes for the greatest number unless some of the handicaps are removed."

Agricultural observations on the Truckee-Carson irrigation project, F. B. HEADLEY and V. FULKERSON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 78, pp. 20, fig. 1*).—This circular presents data and agricultural observations on the Truckee-Carson irrigation project in western Nevada, particularly as noted at the experiment farm operated at Fallon, Nev., in cooperation with the Nevada Station (E. S. R., 22, p. 35). It describes the physical features of the project, showing the object and result of tree planting and what success may be expected with forage crops, vegetables, and fruits. It is shown that practically all of the land available has been taken up, about 35,000 or 40,000 acres being now under cultivation.

Farming with explosives, S. J. CRAWFORD (*Bien. Rpt. Kans. Bd. Agr., 17 (1909–10), pp. 45–48*).—This is a discussion of the economy of breaking farm land with explosives.

It is shown that at a cost of about $1.50 per acre an 8-acre field was dynamited by placing the dynamite in the ground from 2 to 6 ft. deep and at distances of from 20 to 30 ft. "When the fall and spring rains came the water, which formerly stood for days on the ground, was immediately absorbed, leaving the field dry and apparently in good condition." "The yield per acre has shown a marked increase."

The mechanical culture of the soil, M. RINGELMANN (*Rev. Sci. [Paris], 49 (1911), I, No. 11, pp. 336–339*) —This article deals briefly with the applications of various kinds of mechanical power to farm work.

Working trials with hay-harvesting machinery, C. V. BIRK and M. DALL (*Tidsskr. Landokonomi, 1911, No. 6, pp. 377–400, figs. 11*).—This report gives the results of trials of 9 different rakes, mostly side-delivery rakes, and describes each.

[The cost and net returns of agricultural work] (*Jour. Soc. Agr. Brabant et Hainaut, 55 (1910), No. 52, p. 1272; 56 (1911), No. 1, pp. 5, 6*).—The article discusses the relative economy of having work done by a labor-saving machine and by hand labor, as illustrated by machinery for cutting hay, harvesting, and other agricultural machinery.

Practical silo construction, A. A. HOUGHTON (*New York, 1911, pp. 69, figs. 18*).—A treatise on simple and practical methods of constructing concrete silos of all types, with unpatented forms and molds.

The kind of wood for a silo, E. A. BURNETT (*Breeder's Gaz., 59 (1911), No. 16, p. 1002*).—A discussion of the durability of different kinds of wood commonly used for building silos.

The new cement manure shed at Flahult, H. VON FEILITZEN (*Svenska Mosskulturför. Tidskr., 25 (1911), No. 2, pp. 135–141, figs. 2*).—A description of the manure shed with illustrations is given. The area of the shed is 11 by 11 meters (about 43.3 ft. square), or 4 square meters per animal for a herd of 30 cows.

The destruction of hydraulic cements by the action of alkali salts, E. BURKE and R. M. PINCKNEY (*Montana Sta. Bul. 81, pp. 47–131, figs. 16*).—This bulletin, continuing work previously reported (E. S. R., 20, p. 288), deals in definite order with the chemical changes which bring about the disintegration of cement. In the work Portland, slag, and natural cements were used, being tested in regard to their resistance to sea water and various salts, including sodium sulphate, magnesium sulphate, sodium carbonate, sodium chlorid, calcium hydrate, and calcium sulphate, in solutions of various concentrations.

The authors point out that the disintegration of cement by alkali salts is chiefly due to the reaction of these salts with the calcium hydroxid of the cement. As a result of these reactions, relatively insoluble new compounds having greater weight and bulk than calcium hydroxid are formed, and force apart the particles of cement and thus weaken or break the binding material. The binding material is in some instances leached out. As a result of these interactions with calcium hydroxid, sodium sulphate when present produces sodium hydroxid and gypsum, magnesium sulphate produces magnesium hydroxid and gypsum, and sodium carbonate produces sodium hydroxid and calcium carbonate. In the last-named instance, however, there is little increase in bulk, but instead the silicates and aluminates are attacked and dissolved.

"In order for destructive action to become marked the alkali solutions must percolate through the cement work, or at least must penetrate beyond the surface. When the action is strictly confined to the surface, as when briquets of neat cement are immersed in a still solution, the tensile strength may be increased. In such cases the expansive action closes up the pores, making the surface more nearly impervious and preventing the alkali from penetrating further. When cracks are started by the expansive action due to alkali salts, wetting and drying, or freezing and thawing, will hasten the destruction of the cement by extending the cracks already started.

"Any measures that hinder the penetration of the alkali solutions into the interior of the cement will delay the destructive action. For this purpose both soap and aluminum sulphate were tried in laboratory tests and found to afford some protection. The soap, however, in itself had a slightly injurious effect on the tensile strength of the cement. The efficiency of these and of other waterproofers is being further studied [by the authors] and results will be reported in a later bulletin."

The materials of paint manufacture, G. B. Heckel (*Jour. Franklin Inst., 171 (1911), No. 6, pp. 599–614*).—A digest of data regarding the materials used and the processes followed in the manufacture of paint.

Plumbing and household sanitation, J. P. Putnam (*Garden City, N. Y., 1911, pp. 718, pl. 1, figs. 652*).—Historical data, theories which have to do with the general subject of plumbing, and practical and theoretical plumbing problems are discussed in this volume, which represents a course of lectures delivered before the Plumbing School of the North End Union, Boston.

The process of disinfection by chemical agencies and hot water, Harriette Chick (*Jour. Hyg. [Cambridge], 10 (1910), No. 2, pp. 237–286, dgms. 21*).—Studies are reported of disinfection with phenol, hot water, and sunlight and drying.

A general conclusion reached is that "disinfection, whether by disinfectants or by heat, may be considered analogous to a chemical reaction the velocity of which is controlled by external conditions such as temperature or concentration of bacteria and disinfectant."

Kitchens and laundries—their planning, arrangement, equipment, and sanitation, W. P. Gerhard (*Dom. Engin., Philadelphia Ed., 48 (1909), Nos. 3, pp. 62–69, figs. 16; 7, pp. 182–184, fig. 1; Eastern Ed., 50 (1910), No. 3, pp. 61–66, figs. 10; 53 (1910), Nos. 2, pp. 35–39, figs. 5; 3, pp. 63–66, figs. 11; 9, pp. 221–225, figs. 11; 54 (1911), Nos. 3, pp. 54–58, figs. 10; 7, pp. 178, 179; 8, pp. 207–210, figs. 7*).—In this exhaustive discussion of the subject hotels and public institutions are considered as well as home kitchens and laundries.

Chapters are devoted to cooking with different fuels and with electricity.

The text is supplemented by numerous plans and illustrations.

RURAL ECONOMICS.

The average mortality among farmers, according to the Bank of Gotha (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 2, pp. 138, 139*).—The general opinion that farmers are subjected to smaller risks and that mortality among them is lower than for the rest of the population is controverted by tables prepared and based on data collected annually among the adjoining rural population by the Bank of Gotha since 1880. It is shown that excluding farmers engaged in the manufacture and sale of alcohol, where the death rate is particularly high, "the average mortality of the farming population from 15 to 50 years is exactly the same (99/100) as that for the rest of the population."

The farm help problem, F. H. Stadtmueller (*Ann. Rpt. Comr. Agr. Vt., 2 (1910), pp. 104–110*).—The author defines and discusses the growth of the law of division of labor, its general application, and its far reaching and disastrous effects upon agriculture.

It is held that it has degraded the all-around man productively in order to admit greater economic production. Because of the nature of its work agriculture prohibits the application of the law. It thereby forces the farm laborer to possess a greater degree of application and a greater breadth of view than is required of a laborer in almost any other industry, as agricultural wages are not commensurate with the value of the services and in proportion to other wage labor. This is illustrated by showing that the common rate of wages in many factories is 19 cts. an hour for 9 hours' work per day, or $45.50 per month of 234 hours, while the prevailing wages of a dairy farmer are 13 cts. an hour of 11 hours per day, or $39.25 per month of 302 work hours. The law also has the effect of inducing labor to migrate from the farm to the factory and in turn drives back to the farm the poorest elements of labor that have offered themselves to the factory.

The agricultural labor question (*Ztschr. Landw. Kammer Braunschweig, 79 (1910), No. 27, pp. 329–331*).—This article discusses the labor problem in its various aspects, showing the tendency of agricultural labor to migrate to towns and cities. It is pointed out that of the total number of inhabitants in Prussia in 1849 71.93 per cent were living in rural districts; in 1871, 67.57 per cent; in 1900, 56.93 per cent; and in 1905, 54.77 per cent.

The colonization of the United States, A. K. Eckerbom (*Den Inre Kolonisationen i Förenta Staterna. Stockholm, 1909, pp. 114*).—This report, which is issued by the Swedish Committee on Emigration, gives a detailed account and discussion of the occupation of the agricultural land in the United States, the homestead laws, and the economic status of the settlers. A bibliography on the subject is appended.

Changes in agricultural industry, Great Britain, J. L. Griffiths (*Daily Cons. and Trade Rpts.* [*U. S.*], *14 (1911), No. 131, pp. 1025, 1026*).—This report discusses important changes that have occurred in the agricultural industry of Great Britain within the last decade, the most conspicuous being the decrease in arable land (932,110 acres) and in wheat growing (247,990 acres), and the increase in orchard and small fruits (36,472 acres).

A growing tendency for small agricultural holdings to displace the large landed estates is noted, as within the last 25 years 1,795 farms of over 300 acres each have been broken up and at the present time but little more than 3 per cent of the agricultural holdings can be described as large farms. The number of small holdings of more than one acre increased from 509,808 to 510,445 during 1910, notwithstanding there was a reduction in the same period of 37,143 acres in the farmed area of the country.

[Report on conditions of agriculture in East Flanders] (*Soc. Agr. Flandre-Orientale Rap. 1909, pp. LXXXII*).—This report gives statistics and comprehensive observations of agricultural conditions generally in East Flanders during the year 1909.

[Report of agricultural special agents in Spain] (*Bol. Agr. Téc. y Econ., 2 (1910), No. 22, pp. 315–322*).—This is a statistical report based on data submitted by agricultural engineers in the various provinces of Spain relative to acreage, production, etc., of agricultural products on dry and irrigated lands.

The economic position of Danish agriculture, C. Sonne (*Tidsskr. Landökonomi, 1911, No. 2, pp. 98–120*).—This is a careful and comprehensive discussion of the present economic status of Danish agriculture, based on comparisons between the production and values during the 2 years 1887–8 and 1907–8. The author concludes that marked progress has been made and that the present condition of Danish agriculture is, on the whole, founded on sound economic principles.

Report on the trade and commerce of Denmark for the year 1910, L. C. Liddell (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1911, No. 4642, pp. 50, pl. 1*).—In addition to export and import statistics the report gives a detailed review of the agricultural pursuits in Denmark during the year 1910, and how they were affected by tariff reform and other legislation in neighboring states and foreign countries.

It is stated that the cooperative movement has caused the abandonment of some and the development of other agricultural pursuits, and that it has given a stimulus to export trade of agricultural pursuits generally. Data are given as to the work and progress of various cooperative societies, and the number, membership, capital, etc., of each. While some have not paid dividends others have paid as high as 15 per cent, the average of those reported being over 6 per cent. The accounts of the rural cooperative fire insurance societies show a deficit because in fixing the premiums the increased risk of danger from fire to thatched buildings, as the use of agricultural machinery increases, was not taken into consideration.

Report on the trade and commerce of Porto Rico for the year 1910, Churchward (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1911, No. 4657, pp. 22, pl. 1*).—The report contains general agricultural statistics of Porto Rico for 1910, export and import statistics, and data as to wages and labor conditions. It is stated that the supply of labor of all kinds is plentiful, but that some difficulties have been encountered in connection with it because of labor organizations.

Twenty-sixth statistical report of the Department of Agriculture and Commerce, Japan (*Statis. Rpt. Dept. Agr. and Com. Japan, 26 (1911), pp. 1–106*).—This is a statistical report of the area, production, and value of the various agricultural crops in Japan for a period of years including 1910, together with statistics pertaining to poultry, live stock, and the animal plague of 1900–1909.

Report of the Irish Agricultural Organization Society, limited, for the year ending June 30, 1910 (*Rpt. Irish Agr. Organ. Soc., 1910, pp. 144*).—This report reviews the work of various kinds of agricultural societies and credit societies in Ireland for the year ended June 30, 1910, together with committee reports and discussions pointing out the merits and defects of the actual operation of particular kinds of cooperative organizations.

Agricultural prices (Ireland), Newman (*Dept. Agr. and Tech. Instr. Ireland, Agr. Prices, 1881–1909, pp. 6*).—This is a report showing the annual price of live stock and agricultural products in Ireland for each year from 1881 to 1909, and the annual average prices for various intervals during this period.

The prices of farm products, H. C. Taylor (*Wisconsin Sta. Bul. 209, pp. 3–30, figs. 14*).—This bulletin discusses and illustrates the factors which determine the prices of farm products, the relation between prices and farm management, and the forces which influence the supply and price of eggs, butter, potatoes, corn, and other farm products.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13 (1911), No. 6, pp. 41–48*).—Statistics are given on the condition of crops in the United States and foreign countries; the farm value of important products in various places in the United States and at specified times during 1910–11; temperature and precipitation statistics; the cost of producing oats in the different States and Territories in 1909; monthly receipts and stocks of eggs and poultry in the principal cities of the United States; and range of prices of agricultural products for a period of years.

AGRICULTURAL EDUCATION.

A program of agricultural progress, J. HAMILTON (*W. Va. Univ. Bul., 9. ser., 1910, No. 9, pp. 12–24*).—In this address, delivered at the college of agriculture of West Virginia University, the author outlined the needs of agriculture, particularly with reference to restoring fertility, and discussed the functions of the agricultural college, the agricultural experiment station, the state department of agriculture, the National Department of Agriculture, and subordinate agencies in bringing about better conditions.

Agricultural instruction in Algiers (*Bul. Agr. Algérie et Tunisie, 16 (1910), No. 12, pp. 296–303*).—In this article are discussed the different methods of disseminating agricultural knowledge throughout the colony, viz, by the schools of agriculture, departmental and special professors of agriculture, the School of Sciences of Algiers, the botanical and agricultural stations of Algiers, agricultural societies, horticultural and agricultural committees, primary schools, and the annual congress of agriculture held in each of the three principal towns of the departments of the colony.

Tenth annual general report of the Department of Agriculture and Technical Instruction for Ireland (*Dept. Agr. and Tech. Instr., Ireland, Ann. Gen. Rpt., 10 (1909–10), pp. VI+490*).—This is a report on the department's administration and funds, and on details of its work during 1909–10, including agricultural and technical instruction.

The report on agricultural instruction comprises details concerning the work of individual institutions, special classes, lectures, and practical demonstrations carried out by itinerant instructors in agriculture, horticulture, poultry keeping, and butter making throughout the country and by agricultural overseers in congested districts. At the close of the year 1909–10 the department's program of agricultural education had been 10 years in operation, and in some features of instruction the report gives data for the 10 years, or from the organization of the instruction, to show the progress made.

Detailed accounts of the work in technical instruction are given in the reports of inspectors, tables, and appendixes.

The appendixes include statements of the receipts and expenditures under the department's parliamentary grant, endowment fund, etc.; the personnel of the agricultural councils and boards; a table showing by counties the agricultural schemes adopted by the several county committees for 1909, the amount appropriated from the joint fund for each scheme, and the proportions of the total appropriation chargeable to local contributions and to the department's grant, respectively; schemes of instruction in agricultural subjects; prospectuses of agricultural colleges and stations and schools of rural domestic economy; agricultural scholarships and apprenticeships; a program of experimental science, drawing, and domestic economy for day secondary schools; a program for technical schools and science and art schools and classes, including domestic economy; examples of schemes of technical instruction in nonagricultural subjects, including domestic economy; a list of day secondary schools showing the grants paid by the department during 1909–10 for instruction in the subjects of the department's program, including domestic economy, given during 1908–9; and a statement showing the occupations of students, including domestic science classes, attending schools and classes conducted under the conditions of schemes of technical instruction in nonagricultural subjects, etc.

Agriculture in the public schools, G. A. Bricker (*Ed. Rev., 41 (1911), No. 4, pp. 395–403*).—The author considers that agriculture should be taught in the public schools (1) to solve the problem of intensive agriculture and (2) to prepare young men for the business of farming.

An experiment on methods of teaching zoology, J. P. Gilbert (*School Sci. and Math., 11 (1911), No. 3, pp. 205–215*).—This is a progress report on an experiment in teaching high-school zoology, undertaken in the school of education at the University of Illinois to determine the relative merits of the pure science and the applied science methods of approach in teaching.

The experiment was made with two approximately equal sections, under conditions as similar as possible, and extended over one semester. Section A, known as the cultural and disciplinary group, studied insects, birds, frogs, and other zoological specimens for the purpose of learning the functions of the different organs and their significance and their adaptations to the struggle for existence. Section B, known as the economic group, studied the same kinds of specimens, in the same way, and raised the same questions, but did not dwell so long on this phase of the work, thus saving time for an inquiry into the economic importance of the phenomena under observation—their applications to agriculture. The results obtained are summarized as follows:

"The results are only suggestive, in view of the small number of individuals tested. Even allowing for the probable error, however, the applied science method of approach to the study of secondary school zoology appears to have a slight advantage over the pure science approach, when tested by examination grades (the examination being of the pure science type). When tested by average semester grades, the applied science approach shows a somewhat greater advantage. When tested by the percentage of pupils averaging more than 85 per cent in the semester's work, the applied science approach has a slight but appreciable advantage.

"When tested by the ability of the pupils to set up experiments and interpret phenomena (a cultural and disciplinary standard), the applied science approach has a decided advantage."

The teacher believes that the method of investigating classroom problems by comparing the progress of parallel groups of pupils may be made to yield valuable results.

The animals and man, V. L. Kellogg (*New York, 1911, pp. X+495, pl. 1, figs. 243*).—The book is an elementary textbook of zoology and human physiology.

In part 1 the author discusses the parts of animals and how they are used. Part 2 deals with the life history of animals. In part 3 different kinds of animals are classified and their habits and special relations to man given. Human structure and physiology is considered in part 4, prepared by Isabel McCracken, and part 5 has to do with animals in relation to each other, to plants, and to the outside world. There are also appendixes containing information on school equipment, rearing animals, and making collections.

The use of the score card in rural schools, E. A. Cockefair (*Bul. Mo. State Norm. School, Third Dist., 2 (1910), No. 2, pp. 36*).—After discussing the functions of agriculture in rural school courses, the author gives specific directions for judging corn, horses, and dairy cattle. In each case a score card is given with detailed explanations of the different points involved in judging.

Domestic science for schools and homes, Gertrude T. Johnson (*Kansas City, Mo., 1911, 2. ed., rev. and enl., pp. 153, pls. 2, figs. 32*).—This is a text in cooking and a syllabus in sewing, prepared for use in the Kansas City elementary schools. It contains in untechnical language the fundamental theories of foods and their functions, together with more than 200 recipes.

The portion of the book devoted to cooking is divided into 5 parts. Part 1 is a syllabus of the course for the teacher's use, parts 2 and 3 contain lessons for the pupils of the seventh and eighth scholastic years, and part 4 an appendix for the use of classes having more than one lesson per week, for home use, and for general reference. Part 5 describes a light cooking and manual training equipment for classes of 24 pupils. The work in sewing is divided into general suggestions and courses for the sixth, seventh, and eighth scholastic years.

Domestic art in woman's education, Anna M. Cooley (*New York, 1911, pp. XI+274*).—The object of this book is to point out the relationship between domestic art and other elementary school subjects and the place it may occupy in high schools, colleges, or trade schools. It is divided into 4 parts. Part 1 discusses problems confronting those interested in teaching domestic art; part 2, on domestic art in the elementary school, deals chiefly with the factors involved in planning courses of study; part 3 treats of the relation of domestic art to secondary education; and part 4 discusses (1) domestic art as a part of college training for women, and (2) domestic art in other higher institutions of learning. A selected bibliography of books helpful in the study of the various phases of domestic art is appended.

A basis of organization of the course in nature study, O. W. Caldwell (*Nature-Study Rev., 7 (1911), No. 4, pp. 87-90*).—This paper points out that a course in nature study should be organized in a fairly definite way in so far as concerns purposes and the general line of procedure. The native interests of children should be considered, since, though these are not an all-determining factor, they are important and should be utilized.

The children in the grades are accordingly divided into three groups with reference to interest in nature. The first group includes the kindergarten, first and second grades; the second group the third, fourth, and fifth grades; and the third group the sixth, seventh, and eighth grades.

The outlook to nature, L. H. Bailey (*New York, 1911, rev. ed., pp. XII+195*).—This book contains a revision of 4 lectures given in the Colonial Theater, Boston, Mass., in January, 1905, under the auspices of the education committee of the Twentieth Century Club. Lecture 3 discusses "the school of the future," and states that "A man can be trained to think just as accurately by means even of agricultural subjects as by conventional subjects, provided the agricultural subjects are as well systematized and equally well taught."

Crop demonstrations on state and county farms, C. P. Norgord (*Wisconsin Sta. Bul. 208, pp. 3-30, figs. 13*).—The results obtained by the agronomy department in the way of crop demonstrations during the past 2 years, on 20 farms connected with various public, state, and county institutions throughout the State, are given.

Some of the work that is at present under way on most of these farms includes farmers' corn tests, seed selection and breeding, corn planting, alfalfa growing, crop rotation, preparation of seed beds, application of manures, pure-bred seed growing, forage crop culture, use of fanning mills, treatment of grains for diseases, hemp growing, and weed eradication. The farmers' corn tests have shown that there is a great need for better methods of seed selection and storing. A demonstration picnic is held some time during the summer at each farm where demonstrations are being conducted and has proved to be the best means of bringing the farmers of the neighborhood to view the crops and to hear them explained by a representative of the station.

The transportation companies as factors in agricultural extension, J. Hamilton (*U. S. Dept. Agr., Office Expt. Stas. Circ. 112, pp. 14*).—Information is given concerning some of the ways in which the transportation companies of the country have been making an effort to promote agriculture by running educational trains, employing experts to instruct farmers, organizing and conducting demonstration farms, publishing and distributing agricultural bulletins, preparing exhibits, organizing agricultural associations, and cooperating with the agricultural colleges and experiment stations in various other ways. Statistics are quoted showing that the freight tonnage supplied by agriculture in 1909 aggregated 191,381,772 tons and the revenues derived from freight on agricultural products $1,678,058,645.

Conducting a local corn show, B. W. Crossley (*Iowa Agr., 11 (1910), No. 2, pp. 10, 11, fig. 1*).—Suggestions are given for premiums, for the committee on classification and judging, and for the committee on arrangements.

Proceedings of the fifteenth annual meeting of the American Association of Farmers' Institute Workers, edited by W. H. Beal and J. Hamilton (*U. S. Dept. Agr., Office Expt. Stas. Bul. 238, pp. 80*).—This is a detailed report of the proceedings of the meeting held at Washington, D. C., November 14 and 15, 1910, which has been previously noted (E. S. R., 24, p. 95).

MISCELLANEOUS.

Annual Report of Florida Station, 1910 (*Florida Sta. Rpt. 1910, pp. XCVI+XII, figs. 30*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1910, a list of the publications of the year, a general review of the work of the station during the year, departmental reports, and a list of the periodicals received by the station. Most of the experimental work reported is abstracted elsewhere in this issue.

Annual Report of New Jersey Stations, 1909 (*New Jersey Stas. Rpt. 1909, pp. XVIII+459, pls. 55, figs. 14*).—This contains the organization list of the stations, a financial statement for the State Station for the fiscal year ended October 31, 1909, and for the College Station for the fiscal year ended June 30, 1909, a brief report by the director, and departmental reports which are abstracted elsewhere in this issue. A report on the inspection of feeding stuffs has been previously noted (E. S. R., 21, p. 471), as has also one on the inspection of Paris green and lead arsenate (E. S. R., 22, p. 259).

Finances, meteorology, index (*Maine Sta. Bul. 186, pp. 393–435+XII*).—This contains the organization list of the station; meteorological observations noted on page 418 of this issue; a financial statement for the fiscal year ended June 30, 1910; an index to Bulletins 176 to 186, which together with Official Inspections 19–28, previously noted, collectively constitute the twenty-sixth annual report of the station; a list of the publications issued during the year; and announcements and notes on the work, personnel, and equipment of the station.

Government experimental stations [Holland] (*Country Life [London], 29 (1911), No. 751, p. 736, pl. 1*).—This is an account of the experiment stations in Holland which are under the control of the government, in particular the station at Hoorn, which is devoted chiefly to investigations relating to dairying.

Fixing standard weights and measures (*Nevada Sta. Bul. 77, pp. 11*).—This bulletin contains the text of the state law fixing standard weights and measures, the supervision and enforcement of which is placed in the hands of the director of the station as ex officio sealer of weights and measures.

NOTES.

Alabama Canebrake Station.—The State appropriation to the station has been increased from $2,500 to $4,000 per annum. An entirely new board of control has been appointed, no member of which, under a recent law, can succeed himself. The personnel of the new board is as follows: R. R. Poole, O. L. Woodfin, and C. L. Johnston, all of Uniontown, for terms of five, four, and two years, respectively; John C. Webb, of Demopolis, for three years; and Frank I. Derby, of Whitfield, for one year.

F. D. Stevens has resigned as director, this taking effect September 1, and has been succeeded by W. H. Moore.

Idaho University and Station.—F. D. Farrell resigned as director of extension work in south Idaho and superintendent of the southern Idaho substations on July 15 to take up work in the Bureau of Plant Industry of this Department. Walter H. Olin has been appointed director of the extension department and entered upon his duties August 1, with headquarters at Boise.

Iowa College and Station.—H. C. Cosgriff has been appointed field superintendent in the agronomy and soils department of the station to succeed L. W. Forman, who has been appointed instructor in soils. William G. Gaessler has been appointed assistant chemist and L. A. Maynard assistant in chemistry.

Louisiana Stations.—J. M. Jennings and S. Byall, graduates of the Mississippi College, have been appointed assistant chemists at the State Station.

Maine University.—H. G. Bell has resigned as professor of agronomy to accept a commercial position, and has been succeeded by George E. Simmons, formerly associate professor of farm management. W. A. Brown, assistant professor of poultry husbandry, has resigned to become poultry expert for the Canadian Department of Agriculture.

Maryland College and Station.—C. P. Close has resigned as professor of horticulture and horticulturist to accept a position in connection with the pomological investigations of this Department. W. E. Hanger, a 1911 graduate of the Ohio State University, has been appointed assistant agronomist.

Minnesota University and Station.—R. H. Williams has been appointed assistant professor of animal husbandry in the university and assistant animal husbandman in the station.

Missouri University and Station.—A poultry department has been organized for both instruction and experimental work in poultry husbandry and poultry diseases. H. L. Kempster, instructor in poultry husbandry at the Michigan College, has been appointed assistant professor of poultry husbandry, and will be in charge of the department.

The veterinary department is actively engaged in the hog-cholera campaign, sending out over 54,000 doses of serum during the first eight months of 1911. During August alone 15,000 hogs were inoculated and a force of four men is now in the field in the most heavily infected counties. It is believed that at least double the State appropriation of $25,000 for the work is being saved monthly to the farmers of the State.

A new dairy barn is under construction, which it is claimed will be the finest dairy barn in the State. The main structure will be largely of native stone and the two silos connected with it are to be of reinforced concrete. Feed elevators, litter carriers, and other modern equipment are to be installed, and a milk room is to be erected adjoining the barn but completely detached from the stables.

The State Board of Agriculture has offered a $100 scholarship in the short course this winter to the winner of a contest open to farm boys of the State. In this contest complete records of the milk and butter-fat production of at least three cows for the month of September are to be kept, and the award is to be based both on the records themselves and the completeness and accuracy of the reports.

A four-year course for women has been established, leading to the degree of B. S. in Agriculture. This includes much of the home economics course with considerable agricultural training and numerous electives. A short course for girls in home economics is also offered for the first time.

The station is making an extensive exhibit at the county fairs. This exhibit is planned to show in a graphic manner the results of the experiments under way at Columbia and the 18 outlying experimental fields.

Dr. Paul Schweitzer, connected with the institution as professor of chemistry and later of agricultural chemistry from 1872 to 1906 and since that date chemist emeritus, died July 30 at the age of 71 years. He was chemist to the experiment station from its organization and served for a time as director. Dr. Schweitzer was a native of Germany and studied at Göttingen, coming to this country in 1865. He had held positions in the Polytechnic Institute of Philadelphia and the Columbia School of Mines. He received the degree of LL. D. from the University of Missouri in 1897.

F. H. Demaree, acting agronomist in the station, has resigned to take up commercial work and has been succeeded by J. C. Hackleman as instructor in agronomy. H. G. Lewis has been appointed assistant in the soil survey, L. M. Nelson assistant in agricultural chemistry, and P. M. Brandt assistant in dairy husbandry.

Nebraska University and Station.—J. H. Frandson, for the past four years professor of dairying and dairyman at the Idaho University and Station, has been appointed professor of dairy husbandry in the university and dairyman in the station, and entered upon his duties October 1. Fred M. Hunter, a 1905 graduate of the university and at present superintendent of schools in Norfolk, Nebr., has been appointed principal of the school of agriculture to fill the vacancy caused by the death of Prof. A. E. Davisson, previously noted.

New Hampshire College and Station.—F. Rasmussen, whose resignation as head of the dairy department has been reported, has reconsidered his decision and will remain at this institution. W. L. Slate, jr., assistant in agronomy, has acepted a position as associate professor of agronomy at the University of Maine, entering upon his new duties the last of September.

New Jersey College and Stations.—Plans are being formulated for a two-story entomological building. The first story will be devoted to classroom and laboratory work, and the second to offices, entomological collections, and the use of the station. Work has been begun on the new poultry buildings and greenhouses provided for by the State legislature.

A. W. Blair, of the Florida Station, has been appointed associate chemist in the department of soil chemistry and bacteriology, and R. L. Willis assistant chemist in the fertilizer department. E. W. Stafford has resigned as assistant entomologist and has been succeeded by Raymond S. Patterson. C. J. T. Doryland, instructor in the short courses in agriculture, and E. L. Dickerson, of the entomological department, have also resigned, the former to accept an assistant professorship at the North Dakota College and the latter an instructorship at the Newark High School.

North Carolina College and Station.—The appointment is announced of J. P. Pillsbury, of the Pennsylvania College and Station, as professor of horticulture in the college and horticulturist in the station, vice F. C. Reimer, beginning September 1. Dr. J. D. Cecil, assistant in anatomy and physiology in the college and animal pathologist in the station, resigned July 1 to take up commercial work.

Oregon Station.—Harry L. Rees, assistant in botany at the University of Missouri, has been appointed research assistant in plant pathology and has entered upon his duties.

Tennessee Station.—The appointment is noted of J. I. Hardy as assistant chemist.

Texas College and Station.—The death on July 26 is noted of Dr. Raymond H. Pond, plant pathologist to the station since 1909. Dr. Pond was born in Kansas March 31, 1875, and received both the bachelor's and master's degrees at the Kansas College. Subsequently he studied at the University of Michigan, from which he received the Ph. D. degree in 1902, and at the New York Botanical Garden and at Bonn and Strassburg. Previous to going to Texas he had held a number of positions, among them that of botanist and pathologist at the Maryland College and Station in 1900–1, professor of botany and pharmacognosist and director of the microscopical laboratory at Northwestern University in 1906–7, and biologist of the Municipal Sewage Commission of New York City in 1908–9. He had also served as a special assistant to the United States Fish Commission.

C. H. Alvord has resigned as professor of agriculture and superintendent of the college farm to accept a commercial position.

Utah College and Station.—E. P. Hoff, instructor in zoology and assistant entomologist, has resigned to engage in commercial work, and has been succeeded by M. A. Nelson, a graduate of the college.

Vermont University and Station.—Andrew A. Borland, assistant in dairy husbandry in the Pennsylvania College and Station, has been appointed professor of dairying in the university and dairy husbandman in the station.

Washington College and Station.—Leonard Hegnauer has resigned as professor of agronomy in the college and agronomist in the station to accept the professorship of crop production in the University of Illinois, and has been succeeded by Dr. Paul J. White, assistant professor of farm crops in Cornell University and Station. Other appointments are those of Charles F. Monroe as instructor in animal husbandry in the college and assistant animal husbandman in the station and J. L. Stahl as horticulturist of the Puyallup substation.

West Virginia University.—A special horticultural train was operated over the Baltimore & Ohio Railroad through the eastern counties of the State August 7–11. A special feature of the train was the demonstration of improved methods of packing apples and peaches. The home mixing of fertilizer was demonstrated, and alfalfa and forage crops were also discussed.

I. S. Cook, jr., a 1906 graduate of Ohio State University, has been appointed associate professor of agronomy.

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EXPERIMENT STATION RECORD.

Vol. XXV. Abstract Number. No.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

A centrifugal method for the determination of humus, A. A. Wells, W. H. Stevenson, and W. F. Coover (*Iowa Sta. Bul. 124, pp. 370–384, figs. 4*).—Since the official method, as modified by Frear, requires a long time for filtration, and the Mooers-Hampton modification presents some difficulty in the way of preventing losses of humus when the clay is filtered off in a flocculated state and in addition requires a very long time for evaporating the extracts, the authors sought to obtain a new procedure by modification or otherwise. In no case was a satisfactory result obtained by the filtration method.

The authors devised a centrifugal method which utilizes a Gallenkamp centrifuge, containing in its drum a platinum cup for holding the soil. The method is as follows:

"After washing free from chlorids, the soil is transferred to a 1-liter shaking bottle with 500 cc. of a 4 per cent ammonia solution, using a glass rod to loosen the soil. . . . The flask is then stoppered with a rubber stopper, placed in the shaking apparatus, [which is described], and shaken at the rate of 50 revolutions per minute for 3 hours. At the end of this time the bottles are removed and the contents allowed to settle for 10 minutes. . . . About 350 cc. of the solution is then decanted through a funnel into the centrifuge bowl, the top clamped in place, and the solution whirled for 10 minutes. By means of a thumb screw a part of the solution is drawn off through the glass tube while the machine is still at full speed. The first 10 cc. is discarded and then about 70 cc. of the solution is collected. This amount is readily caught in a small beaker, which should be covered at once with a cover glass to prevent loss by evaporation.

"Fifty cc. of the solution, which represents 1 gm. of soil, is drawn off with a pipette, placed in a weighed porcelain dish, and evaporated to dryness on a steam bath. The dish is then dried to constant weight in an oven at 110° C., and the weight recorded. The contents of the dish are then ignited in a muffle furnace and weighed again after cooling to room temperature. The loss in weight upon ignition represents the weight of the humus, and the increase of the last weighing over the empty dish represents the weight of the ash."

With this method the time required for determining the humus is reduced to one-third of that usually employed for the official method.

Studies on the detection of adulteration in bone superphosphate, G. Masoni (*Staz. Sper. Agr. Ital., 43 (1910), No. 4, pp. 297–328; abs. in Chem. Zentbl., 1910, II, No. 8, pp. 595, 596; Chem. Abs., 5 (1911), No. 8, p. 1484*).—Methods for the detection of adulteration are described and examinations of a number of samples of different kinds of superphosphate with reference to adulteration are reported and discussed.

A modified method for estimating sugar in sugar beets, A. Herzfeld (*Ztschr. Ver. Deut. Zuckerindus., n. ser., 46 (1909), II, pp. 627–639, figs. 3*).—This is a simplification of the Sachs-Le Docte method, and is carried out as follows:

Twenty-six gm. of the beet paste is placed in a special metal beaker, an illustration of which is given, and 177 cc. of a solution consisting of 5 parts of lead acetate solution (German Pharmacopœa) and 95 parts of water is added. The beaker is then stoppered with a cork covered with tinfoil, and the mixture shaken thoroughly, filtered, and polarized. If a coarse paste is being examined, the mass in the beaker is placed in a water bath at 75 to 80° C. for 30 minutes, then cooled, filtered, and polarized.

Sugar estimation in beets according to Herzfeld's new institute method, O. Bialon and W. Taegener (*Deut. Zuckerindus., 35 (1910), No. 45, Beilage 1, pp. 865, 866*).—A critical comparative study of the Pellet and the Rapp-Degener methods, and of the new method of Herzfeld noted above.

The authors conclude from their work that the new Herzfeld method must be considered, for the present at least, the most accurate and convenient one for laboratories making a great many sugar determinations in beets. They criticize, however, the tinfoil cork stopper.

Calorimetry of Argentina butter, E. H. and L. H. Ducloux (*Trab. 4. Cong. Cient. Santiago de Chile, 4 (1908–9), pp. 154–160*).—Analytical constants of butter are reported. The authors find that determining the heat of combustion is of value in order to supplement the saponification, the Reichert-Meissl number, and the index of refraction for detecting adulterated butter.

A method for the separation of the seven permitted coal tar colors when occurring in mixtures, T. M. Price (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 180, pp. 7*).—According to the author, no analytical scheme seems to exist in the literature for separating coal tar colors when present in a mixture containing one or more of the seven coal tar colors permitted by the regulations governing meat inspection. A method is therefore proposed which is based on the solubility and insolubility of the colors in the following reagents: A supersaturated solution of ammonium sulphate, a supersaturated solution of sodium chlorid, calcium chlorid solution (25 per cent), dilute ammonia (1 : 100), dilute acetic acid (5 per cent), stannous chlorid solution, acetone, alcohol (95 per cent), amyl alcohol, acetic ether (ethyl acetate), ether, sulphuric (ethyl) ether, and hydrogen peroxid (3 per cent).

Analysis of sweetened condensed milk, A. Backe, A. Wiborg, and E. Röer (*Analyst, 36 (1911), No. 421, pp. 138–141*).—The authors point out that in tins of condensed milk which have stood for a time the fat has a tendency to rise to the top and the lactose and saccharose to crystallize out on the bottom. It is also possible for these separations to take place during the process of manufacture. These facts often cause considerable error in the analysis of condensed milks. To illustrate this they present the results of zonal analyses of canned condensed milk.

The detection of benzoic acid in meats and fats, K. Fischer and O. Grünert (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 12, pp. 721–734*).—The method employed is as follows:

The material is finely minced. 50 gm. weighed out and 100 cc. of 50 per cent alcohol added. This is acidified with dilute sulphuric acid and allowed to stand for 30 minutes, with frequent agitation. The mixture is then passed through a piece of gauze cloth and the residue expressed to remove the remainder of the liquid; the extract made alkaline and heated on the water bath until all the alcohol is driven off, then made up to a bulk of 50 cc., mixed with 5 gm. sodium chlorid, acidified with dilute sulphuric acid, heated to the boiling point, cooled, and filtered, the filtrate shaken with ether, and finally washed several times with water. The ether extract is evaporated to dryness at a low heat. The extract thus obtained can be used for the tests, or it may be converted into salicylic acid by the procedure recommended in the article.

Comparative tests were made with different methods for detecting the benzoic acid. For the test with ferric chlorid the residue was dissolved in water containing ammonia, the solution evaporated to 1 cc., and 1 drop of 1 per cent ferric chlorid solution added. The author was able to detect 0.02 per cent of benzoic acid in smoked and fresh flesh and from 0.005 to 0.01 per cent in fats. Rohrig's ethyl-ester odor test was sensitive to 0.02 per cent benzoic acid in fresh meat and 0.01 per cent in fats, but no result was obtained with smoked meat. Brevan's test gave negative results By converting the benzoic acid into benzaldehyde, 0.04 per cent was detected in fresh meat, but with smoked meat the result was negative. With lard, 0.01 per cent could be found, while the results with margarin were variable, and with butter always negative. Mohler's test, which is based on the conversion of the benzoic acid into the red-brown colored ammonium compound of amido-nitro or the diamido-benzoic acid, also yielded negative results.

Detection of benzoic acid in meats and fats, K. FISCHER and O. GRUENERT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 9, pp. 580–583*).—The authors investigated the von der Heide and Jakob modification (E. S. R., 23, p. 12) of Mohler's method,[a] which avoids the high temperature recommended by Mohler, and found that it could also be employed for detecting benzoic acid in butter, lard, and fresh, pickled, and smoked meats.

The authors have also modified their own method, which is given in the abstract above, for extracting the benzoic acid from butter and fats, and now proceed as follows: Fifty gm. of the butter are placed in a 300 cc. Erlenmeyer flask with 150 cc. of a 1 per cent sodium bicarbonate solution, boiling for 5 minutes, and shaking during the process. The hot fluid is transferred to a separatory funnel, and the aqueous solution, which now contains the benzoic acid, is separated from the fat. The cloudy alkaline solution is then neutralized with half-normal sulphuric acid, using methyl orange as the indicator. In order to obtain a clear solution quickly, 10 cc. of Fehling's copper sulphate solution and 10 cc. of potassium hydrate (containing 31.15 gm. potassium hydrate per liter) are added. After the precipitate has settled the supernatant fluid must possess a slightly acid or neutral reaction. The solution is filtered, the clear filtrate acidified with dilute sulphuric acid, and the benzoic acid extracted with ether. The ether extract is washed several times with water and the ether evaporated on the water bath with the aid of a current of air. On detecting the benzoic acid it is converted into salicylic acid, according to the method recommended by these authors.

The authors have also investigated the Jonescu method (E. S. R., 21, p. 523), but found it to be less valuable than the modified Mohler method.

Estimation of tartaric acid, A. HECZKO (*Ztschr. Analyt. Chem., 50 (1911), No. 1, pp. 12–21; abs. in Analyst, 36 (1911), No. 421, p. 148*).—In the hands of some chemists the Goldenberg method,[b] which is the method usually employed, sometimes yields results which vary from the correct figure not less than from 0.4 to 0.5 per cent. This is due to the fact that potassium bitartrate is not altogether insoluble in alcohol, and also to the action of the neutral potassium tartrate on freshly precipitated calcium carbonate.

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[a] Bul. Soc. Chim. Paris, 3. ser., 3 (1890), p. 414; Ztschr. Analyt. Chem., 36 (1897), p. 202.

[b] Analyst, 33 (1908), p. 200.

The author points out that the error due to the first cause may be eliminated by treating the potassium bitartrate with standard caustic alkali, just as though it were a sample of argol, instead of titrating it directly. He also points out that where a high lime content is present the amount of potassium carbonate specified by Goldenberg is insufficient, and is liable to indicate very much less tartaric acid than is present in the sample. Other errors may be introduced by mechanical losses during evaporation.

Estimation of total tartaric acid, A. HECZKO (*Ztschr. Analyt. Chem., 50 (1911), No. 2, pp. 73–82; abs. in Analyst, 36 (1911), No. 421, pp. 148, 149*).—An investigation of the Moszczenski method[a] showed that with pure tartrates the results are correct, but with crude tartar they are from 1 to 2 per cent too high. The method is, however, more rapid than the Goldenberg process.

Methods for estimating ethyl alcohol quantitatively, A. BAUDREXEL (*Deut. Essigindus., 15 (1911), No. 9, pp. 67–69*).—A discussion in regard to the existing methods for the quantitative determination of alcohol.

Hydrolysis of casein, T. B. OSBORNE and H. H. GUEST (*Jour. Biol. Chem., 9 (1911), No. 3–4, pp. 333–353*).—On the basis of a summary of data, including the investigations reported and earlier work from Osborne's laboratory, it is pointed out that there is a relatively large discrepancy between the sum of the nitrogen of known decomposition products of casein and the total theoretical amount. Possible explanations are suggested.

The paper as a whole is an important contribution to the chemistry of casein.

The occurrence of sucrose in grapes, W. B. ALWOOD (*Jour. Indus. and Engin. Chem., 2 (1910), No. 11, pp. 481, 482*).—The author and his coworkers "found sucrose in several varieties of grapes belonging to the species commonly cultivated in the United States, but more especially in a new seedling grape discovered growing near Sandusky, Ohio, which was until then unknown to horticultural literature.

"The known varieties in which sucrose was found to occur are Hayes, Pocklington, and Worden. These showed sucrose in quantities varying from 4.49 to 5.66 gm. per 100 cc. of juice. The new seedling, however, showed sucrose varying at different dates from 7.06 to 9.73 gm. per 100 cc. of juice, with a total sugar content varying from 15.93 to 19.52 gm. per 100 cc. of juice. . . . [The author and his coworkers] have now examined in the laboratory a large series of samples of practically all the wine and table grapes grown in the Eastern States, and in no case other than mentioned above have [they] found sucrose in appreciable quantity."

The occurrence of sucrose (cane sugar) in unfermented grape juice (*Pure Products, 7 (1911), No. 8, pp. 434, 435*).—Substantially noted above.

Enological studies, W. B. ALWOOD (*U. S. Dept. Agr., Bur. Chem. Bul. 140, pp. 24*).—In addition to reporting what is noted in the abstract above, the author in this bulletin gives the results of examining the Illinois City, Nectar, Norton, Catawba, and Montefiore varieties of grapes for sucrose. Sucrose was present in appreciable quantities in the first three varieties and in the last two, in amounts ranging from 0.04 to 0.4 per cent, which, according to the author, does not point positively toward the presence of sucrose.

Comparing the results obtained by examining the seedling grape (see abstract above) from the time it became edible until it was overripe during 1909 with those obtained in 1910 showed that "the total sugar content in the fresh fruit varied about 3 per cent in the first year and about 5 per cent in the second year. The ratio of reducing sugar to sucrose content varied from 1:0.80 to 1:1.04 in 1909 and from 1:1 to 1:1.19 in 1910, thus showing a fairly constant proportion between these two forms of sugar. The total acid content decreased about one-third in each year during the period the variety was under examination."

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[a] Jour. Soc. Chem. Indus., 17 (1898), p. 215.

Some further work conducted during 1909 and 1910 in regard to the sugar and acid content of the grape, sampled at different intervals during ripening and at full maturity, are also reported. During 1909 the grapes examined were of the Catawba, Montefiore, and Norton varieties, and the seedling noted above. For the Catawba grapes it was noted that an increase in sugar and a decrease in acid took place. "The Montefiore grapes showed an insignificant loss of sugar for the period as a whole and a very appreciable loss of acid. In the case of the Norton the sugar remained practically the same, but the acid was greatly decreased . . . The seedling showed a decided gain in sugar and an important loss in acid, considering the entire period, but there was a phenomenal gain in sugar during the second period and an equal loss during the next one. This must be credited to the uneven growth and ripening of this seedling, normal samples being hard to obtain during the fall of 1909."

During 1910 the varieties Brighton, Catawba, Clinton, Concord, Delaware, Ives, Norton, Pocklington, and Worden, and the seedling were examined. The period for sampling in this investigation was much longer than that of 1909.

"For Catawba the total sugar does not in any sample reach the average of the general crop of that section, but the acid is about at the minimum for this variety on the date when the last sample was taken. At that time the sugar had apparently decreased, but the difference was too slight to be considered, in view of the difficulty of taking two samples of grapes from the same lot which do not show similar differences in composition. This variety in 1910 was high in sugar wherever the growth conditions were good. The fruit as sampled more than doubled in sugar after the berries began to color and lost more than half of the acid content shown in the first sample. The very decided loss of acid even for the last 7 days, amounting to 0.481 per cent, is most important, although the sugar increased only 1.16 per cent. The ratio of increase of sugar to loss of acid is very low for this variety. The observations with this variety were not continued long enough to be conclusive, according to the author.

"Clinton was sampled for a longer period than any other variety. . . . The analyses show that there was some increase of sugar up to the last sample, loss of acid is not so important as for Catawba, but the gain in sugar in proportion to the loss of acid is greater.

"The Concord samples were in remarkably good condition at the last analyses. While neither the gain of sugar nor the loss of acid is remarkable in total amount, yet the results show a great improvement in the fruit as sampled for this study as compared with the samples harvested for the vintage. . . . The proportional increase of sugar to loss of acid for this variety is above that of any of the strictly wine grapes.

"The data for Delaware show that . . . the rise in sugar during the 26-day period when this variety was sampled was not so great in proportion to the total as was found in the Catawba, Clinton, or Norton, but the drop of over one-half in total acid is of the greatest significance, and the proportional increase of sugar to acid lost is greater than in the other varieties of strictly wine grapes mentioned.

"Ives was uniformly poor in quality in 1910, but the data as to acid decrease and proportional sugar increase are important.

"Norton shows a consistent and steady rise in sugar and a notable decrease in acid during the period of sampling. Yet in the maximum sample the sugar was lower and the acid higher than is usual for this variety when grown in the most suitable environment. Evidently this grape requires a longer growing season than is usual at Sandusky. The acid-sugar ratio, however, greatly exceeds the figure for Catawba, and the percentage increase of sugar is the greatest recorded for any variety.

"Pocklington is of too little consequence as a vintage fruit to warrant an extended study of the character here undertaken. . . .

"The Seedling, whose peculiar composition led to the sucrose investigation, was also included. The commercial importance of this grape in its present development is slight, but the remarkable fact that its ratio of loss of acid to increase of sugar is 1:23.6 is a most notable item in the chemistry of the grape. If . . . accompanied by greater vigor, a valuable product should result.

"Worden is so much like Concord that chemically it is not necessary to study the two varieties in an investigation of this nature. . . . It is, however, notable that this variety when fully ripe is rich in sugar, with a proper proportion of acid."

A chemical investigation of the oil of chenopodium, E. K. NELSON (*U. S. Dept. Agr., Bur. Chem. Circ. 73, pp. 10*).—Four authentic samples of Maryland chenopodium oils (3 from steam stills and 1 from an old-fashioned pot still) were submitted to a chemical and physical analysis. The results on examining the steam-still oils were as follows: Specific gravity at 25° C., 0.955 to 0.970; n_D at 25° C., 1.4723 to 1.4726; a_D at 25° C., —5.4° to —8.8°, and the solubility in 70 per cent alcohol, 1:3 to 1:7. For the pot-still oil the figures were: Specific gravity at 25° C., 0.9584; n_D at 25° C., 1.4725; a_D at 25° C., —6.3°, and solubility in 70 per cent alcohol 1:6.

In addition to the above the author examined a sample of chenopodium oil obtained on the open market, with the following results: Specific gravity at 25° C., 0.9694; n_D at 20° C., 1.4780; a_D at 20° C., —0.35°; solubility in 70 per cent alcohol, 1:3; acid number, 0; ester number, 5. On fractionating this oil at 8 mm. about 15 per cent of hydrocarbon was obtained, which, when distilled over sodium, yielded a pleasant smelling liquid having a boiling point of 176° C. (766 mm.), a specific gravity of 0.8513 at 20° C., n_D at 20° C., 1.4828, and a_D at 20° C., —18.5°. Cymene was noted in the fraction. The fraction coming over before ascaridol contained at least 4 per cent of dextro camphor, which accounts for the low rotation of the sample.

Some tests which were also made to determine the nature of ascaridol seemed to indicate, according to the author, that it is an organic peroxid. Formulas are presented which show a relationship to oxythymo quinon.

Lime-sulphur wash, R. HARCOURT (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 100–102*).—This is a study of the effect of adding freshly-slaked and air-slaked lime, and also lead arsenate, Paris green, and calcium arsenite, to lime-sulphur sprays.

The results for lime show that while there is a breaking down of the polysulphids, this is hardly in such an amount as to condemn the addition of lime to lime-sulpur sprays. Air-slaked lime was less destructive to the wash than freshly-slacked lime. The author, however, recommends the latter because it is not so granular and does not settle rapidly.

The results obtained for arsenicals correspond to the findings previously reported (E. S. R., 23, p. 60), and show that "Paris green reduces the strength of the wash nearly 50 per cent, whereas the reduction caused by the other two is not sufficiently great that their use could be condemned. Lead arsenate does not affect the strength of the wash quite so much as calcium arsenite, but it is much more expensive, and a choice between the two will depend upon which will be the safer to apply to foliage."

The utilization of crop plants in paper making, C. J. Brand (*U. S. Dept. Agr. Yearbook 1910, pp. 329–340, figs. 3*).—This is a discussion and report of work carried on with cornstalks, broom corn, hemp stalks, saccharin and nonsaccharin sorghum stalks, cotton stalks, flax and rice straw, bagasse, tules, hemp wastes, cotton hull fiber, *Epicampes macroura* (a southwestern grass, the tops of which are a by-product from the root-brush industry), Arundo, Arundinaria, Eulalia, and several other plants with regard to the possibility of utilizing them as a source of raw material for paper making.

As the result of tests and observations, the author believes that "a point may soon be reached where crop by-products can be made into pulp and paper at a profit to both the farmer and the manufacturer. There does not seem to be any reasonable hope at the present time of producing paper stock from crop wastes that will be cheap enough to use for printing newspapers. This is due chiefly to two causes—the low cost at which such paper can be produced from ground wood and the striking adaptability of ground wood pulp to the newspaper printing industry. . . . Wood will probably be used for making news paper long after other materials have acquired importance in many branches of the chemical pulp industry. . . . While the conservation of only a few of the by-products of the farms yielding paper fiber can be accomplished profitably in the near future and only a few plants promise to be money-makers immediately if grown solely for paper production, it seems very probable that raw products now scarcely considered may in a few years play an important part in the paper and pulp industry"

Manufacture of potato spirit in Germany, R. P. Skinner (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 148, pp. 1167–1169*).—After discussing the classification and the derivation of alcohol, the author details the processes for preparing alcohol from potatoes, as practiced in Germany. Statistics in regard to prices and production are included.

Yearbook of chemistry, edited by R. Meyer et al. (*Jahrb. Chem., 19 (1909), pp. XII+607*).—This is a report of the more important progress made in the field of pure and applied chemistry for the year 1909.

Proceedings of the twenty-seventh annual convention of the Association of Official Agricultural Chemists, edited by H. W. Wiley (*U. S. Dept. Agr., Bur. Chem. Bul. 137, pp. 211, figs. 3*).—This is the official report of the proceedings of the convention held at Washington, D. C., November 10–12, 1910. A summarized account of the meeting has been already noted (E. S. R., 24, p. 196).

METEOROLOGY—WATER.

[The organization of agricultural meteorology], L. Dop (*Rapport Présenté au Comité Permanent sur la Question N. 6 du Programme de l'Assemblée Générale de 1911 Concernant la Météorologie Agricole. Rome: Inst. Internat. Agr., 1911, pp. 61*).—This is a report to the International Institute of Agriculture setting forth the importance of organizing systematic international observations in agricultural meteorology and proposing a plan for such organization.

Handbook of climatology, J. Hann (*Handbuch der Klimatologie. Stuttgart, 1911, vol. 3, pt. 2, 3, rev. and enl. ed., pp. IX+713, figs. 12*).—This is a third enlarged and revised edition.

Reduction of climatological elements, I, V. LÁSKA (*Sitzber. K. Böhm. Gesell. Wiss. Math. Naturw. Cl., 1910, Art. XI, pp. 25, figs. 2*).—This is a critical study of methods of reduction of climatological elements.

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 4 (1911), pt. 1, pp. 1–23, figs. 5*).—This number contains the following articles: Origin of the Permanent Ocean Highs (illus.), The Aleutian and Icelandic Lows, Vertical Temperature Gradients and Convection Limits (illus.), and Levels of Maximum and Minimum Cloudiness, by W. J. Humphreys; and a Barometric Wave in Kansas (illus.), by T. B. Jennings.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER, C. M. DAMON, and R. N. HALLOWELL (*Massachusetts Sta. Met. Buls. 269, 270, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during May and June, 1911. The data are briefly discussed in general notes on the weather of each month.

Weather report, W. H. DAY (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 48–54*).—Observations during 1910 on temperature and precipitation, as well as on frost, wind movements, and damage by lightning, at representative stations in different parts of Ontario are given in a series of tables.

The weather of the past agricultural year, F. J. BRODIE (*Jour. Roy. Agr. Soc. England, 71 (1910), pp. 358–363*).—This is a brief account of weather conditions in the United Kingdom during 1910, including tabulated data on rainfall, temperature, and sunshine.

Meteorological observations, 1901–1910, T. MARR (*Meded. Proefstat. Java-Suikerindus., 1911, No. 8, pp. 91–142, fig. 1, chart 1*).—This article describes the equipment used at the meteorological station at Passoeroean, Java, and summarizes the results of observations at the station from 1901 to 1910, inclusive, on pressure, temperature, sunshine, evaporation, cloudiness, rainfall, wind velocity, and temperature of the soil for different depths.

Climate of the coast and alluvial districts of Belgium, J. MASSART (*Rec. Inst. Bot. Léo Errera Bruxelles, 7 (1908), pp. 208–255, figs. 3*).—The climatic conditions of these districts of Belgium are discussed in their relation to the distribution and adaptation of plants.

Mountain snowfall observations and evaporation investigations in the United States, F. H. BIGELOW (*U. S. Dept. Agr. Yearbook 1910, pp. 407–412, pl. 1*).—This article points out the scientific and practical importance of observations which are being made by the Weather Bureau on the snowfall in western mountain ranges in relation to water supply and on evaporation from lakes and storage reservoirs, particularly at Reno, Nev., and on Salton Sea. The methods employed in this work are briefly described.

A note on the evaporation gradient in a woodlot, M. G. DICKEY (*Ohio Nat., 11 (1911), No. 7, pp. 347–349*).—Observations on the evaporation at different heights from the ground in a woodlot are reported, showing "that the greatest evaporation has occurred in every case at the 6-foot level, pointing to a decrease in relative humidity from below upward. The 35-foot reading exhibits a modification of this relation, which is due to the moisture given off in the transpiration of the leaves in the forest crown." The data do not show a uniform increase of the saturation deficiency from the lowest level upward.

Depositional phases of eolation under the stimulus of aridity, C. R. KEYES (*Abs. in Science, n. ser., 33 (1911), No. 862, p. 29*).—The following abstract is here given of a paper read before the Iowa Academy of Science:

"It is now a question whether wind-scour under the stimulus of a typically arid climate is not actually the most potent and persistent of all erosive agencies. Under favorable conditions its general efficiency must greatly exceed that of stream action in normally moist lands. At any rate, erosionally, its world's work is probably surpassed neither by that of hydrasion nor by that of glaciation."

Nitrogen in rain and snow, N. KNIGHT (*Abs. in Science, n. ser., 33 (1911), No. 862, p. 28*).—This is an abstract of a paper read before the Iowa Academy of Science, as follows:

"Seventeen samples of rain and snow were collected on the college campus at Mount Vernon, Iowa, during nine months of the year 1909–10. The nitrogen in the free and albuminoid ammonia and in the nitrates and nitrites was determined Comparisons were made of the relative amounts of nitrogen precipitated with the rain and snow. According to the experiments, each acre would receive in the nine months between 13 and 14 pounds of nitrogen from the rains and snows."

Cannonading against hail, J. M. GUILLON (*Jour. Agr. Prat., n. ser., 21 (1911), No. 14, p. 442*).—This is a brief account of organized efforts in France to prevent hailstorms by cannonading.

The climatic requirements for fruit culture, P. HOLDEFLEISS (*Ber. Landw. Reichsamte Innern [Germany], 1910, No. 17, pp. 78–86*).—This article discusses the moisture, temperature, and sunshine conditions best suited to fruit culture.

Rainfall distribution over the growing period of wheat, A. J. PERKINS and W. J. SPAFFORD (*Jour. Dept. Agr. So. Aust., 14 (1911), No 10, pp. 964–966*).—The distribution of rainfall and the yield of wheat from 1905 to 1910 on the experimental field of the Roseworthy Agricultural College, South Australia, are shown in the following table:

Rainfall distribution and yield of wheat at Roseworthy Agricultural College, 1905–1910.

Year	Seeding and winter rain, May July	Spring rain, August–October	November rain.	Total useful rain	Rain without influence	Average grain yield of plats		Rain on fallows of preceding year, August–April.
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Bu*	*lbs*	*Inches*
1905	6.89	4.99	0.25	12.13	4.58	28	30	9.28
1906	5.82	7.77	2.26	15.85	3.87	20	3	8.41
1907	4.68	4.55	1.86	11.09	3.96	16	8	14.07
1908	7.67	7.03	.07	14.77	2.97	30	28	9.79
1909	8.53	8.63	2.08	19.24	3.81	30	0	11.42
1910	8.87	6.51	1.18	16.56	7.31	20	54	17.79
Means of 27 years	6.35	4.51	1.04	11.90	5.75			11.30

The author concludes from his observations that the ultimate success of the wheat harvest depends primarily on the existence of normal conditions at seeding time followed by good growing winter weather. When the rainfall during this period falls decidedly below the 6.35 in. shown in the table as the mean of 27 years the ultimate yield is likely to suffer.

The agricultural duty of water, W J MCGEE (*U. S. Dept. Agr. Yearbook 1910, pp. 169–176*).—The author discusses the relation of the soil to soil water, soil-plant circulation, the ratio of crop to water supply, and the duty of water, and finally reaches the conclusion that "in a broad way it may be said that the final duty of water is to sustain a human life a year for each 5 acre-feet used effectively in agriculture."

Daily river stages at river gauge stations on the principal rivers of the United States. Part X, For the years 1909 and 1910, H. C. FRANKENFIELD (*U. S. Dept. Agr., Weather Bur. Doc. 453, pp. 397*).—This is the tenth of the series of reports on "river gauge readings, the publication of which was begun by the Signal Service and has been continued by the Weather Bureau. . . . The tabulated gauge readings are accompanied by a statement which includes the locations of the stations, descriptions of gauges and bench marks, heights of flood stages, low-water and flood marks, and other data, for the various river stations whose gauge readings are included in the tables."

Agricultural and industrial hydrology of Argentina, E. H. DUCLOUX (*Trab. 4. Cong. Cient. Santiago de Chile, 4 (1908-9), pp. 5-38+[21]*).—This report deals with the surface and underground waters of different districts of Argentina and gives data regarding the distribution, quantity, and composition of the waters.

American mineral waters: The New England States, W. W. SKINNER and G. W. STILES. Jr. (*U. S. Dept. Agr., Bur. Chem. Bul. 139, pp. 111, figs. 2*).—This is the first of a proposed series of bulletins on American mineral waters. See also a previous note (E. S. R., 17, p. 641). The bulletin defines natural and mineral waters, discusses the origin of ground waters and the chemical and physical agencies affecting their composition, and describes methods of collection and analysis, stating results, and classifying and naming waters.

The methods of bacteriological examination followed by the Bureau of Chemistry are described in detail. Analyses of 5 waters, from Connecticut, 8 from Maine, 13 from Massachusetts, 6 from New Hampshire, 3 from Rhode Island, and 3 from Vermont are given. The springs are described and the quality of the water as shown by analysis is indicated. The advertised analysis, when available, is given in each case for comparative purposes.

Farm well water, R. HARCOURT (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 30 (1910), pp. 79-81*).—Of 28 samples of farm well water of which analyses are here reported only 4 were considered safe for drinking purposes.

Pond fertilizing experiments, KUHNERT (*Landw. Wchnbl. Schles. Holst., 61 (1911), No. 25, pp. 474-478*).—A brief account is here given of a series of experiments during 1910 with Thomas slag, nitrate of soda, kainit, lime, and manure to test this method of increasing the supply of food in fish ponds

Such use of fertilizers was found as a rule to give a profit in increased amount of fish products. The addition of nitrate of soda to Thomas slag and kainit was found to be especially profitable in increasing the growth of water plants suitable for food for fish. Liming also gave good results. The use of manure was found to be beneficial when employed with care, but as a rule commercial fertilizers proved to be the most suitable for the purpose.

On the decomposition of water by ultraviolet light, A. TIAN (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 15, pp. 1012-1014*).—The experiments here reported indicate that under the action of light from a mercury vapor lamp in quartz, water is decomposed into hydrogen and hydrogen peroxid with ultimate evolution of oxygen. Eventually, therefore, the action of the light is identical with that of electrolysis as far as the gases evolved are concerned.

Home waterworks, C. J. LYNDE (*New York, 1911, pp. XIII+270, figs. 106*).—This is one of the series entitled The Young Farmer's Practical Library, edited by E. Ingersoll, and is described in the subtitle as a manual of water supply in country homes. It deals in a concise, simple manner with the value of water indoors; first steps in kitchen equipment; underground water, wells, springs, rivers, lakes, and cisterns as sources of water supply; the construction and operation of pumps; gravity and pneumatic tanks; and plumbing and sewage disposal. A list of firms dealing in water supply and plumbing materials is appended.

The protection of water supplies, H. C. H. SHENTON (*Surveyor, 39 (1911), Nos. 1008, pp. 698-701; 1009, pp. 732, 733*).—The author attempts to show in this article that it is impossible under present conditions to agree upon any standard, "conformation with which shall prove that water is incapable of producing disease in a greater or less degree." He urges the fixing of a standard "which shall prove that the water is free from given definite organisms believed to be harmful."

Septic tanks for sewage on country places, E. McCULLOUGH (*Concrete [Detroit, Mich.], 11 (1911), No. 6, pp. 37, 38, figs. 2*).—In view of the increasing use of septic tanks for rural homes, this article describes tanks of simple construction for this purpose, particularly the use of concrete in such construction.

SOILS—FERTILIZERS.

Alkali soils, C. WILLIS and J. V. BOPP (*South Dakota Sta. Bul. 126, pp. 75–93, map 1*).—This bulletin reports the results of determinations of soluble salts, carbonates, and organic matter of different soil types of South Dakota.

It is stated that "alkali is found to a greater or less extent over the entire State, however there are certain areas where the extent of the injury is greater than in others. Some of the soils did not contain a large amount of soluble salts. The injury to the growing crops in such case is due largely to excessive moisture or poor drainage."

Counteracting evaporation by cultivation and mulching to prevent the accumulation of the salts at the surface, and treatment with gypsum, where large amounts of carbonates occur, were found to give temporary relief. "However, since many of these soils are found in depressions where there is an excess of water in certain periods of the year, and since the salts are very soluble it necessarily follows that they may easily be carried away in solution. Tile drainage will therefore afford permanent relief. Flooding an irrigated section will wash the salts deeper into the subsoil where it loses its harmful effects. Analyses of drainage waters in various sections have shown that they carried large quantities of salts in solution. Of course surface drainage will also greatly aid, yet it is not as immediate as tiling."

Alkali lands, their utilization and improvement, N. M. TULAIKOV (*Solontsy, Ikh Ispol'zovanie i Uluchshenie. St. Petersburg: Govt., 1910, pp. 188, figs. 10*).—The preface states that this is a report by the author to the department of agriculture of Russia which had sent him to the United States to study the utilization of alkali soils. He spent 18 months in this country, and describes at length all the instances of improving alkali lands which he saw. He also reviews the more important part of the American literature on alkali lands, but does not consider the literature of other countries. His observations are summarized under the following headings: Origin and distribution of alkalis, effect on vegetation, tolerance of plants to alkali, utilization and methods of improving alkali soils, and use of salt water for irrigation.

Soils: Their composition, requirements, and possibilities, C. A. MOOERS (*Bien. Rpt. Tenn. Dept. Agr., 1909–10, pp. 274–283*).—This article deals particularly with the use of lime on different types of Tennessee soil.

The soils of Washington, R. W. THATCHER (*Washington Sta. Popular Bul. 34, pp. 4*).—This discusses in a popular way what chemical analysis of soils shows, and gives tables showing the average composition of typical Washington soils as well as the amounts of plant food removed from the soil by different crops.

The soils of the coast and alluvial districts of Belgium, J. MASSART (*Rec. Inst. Bot. Léo Errera Bruxelles, 7 (1908), pp. 303–344; Sup., 1910, maps 5–9*).—The soil conditions of these districts of Belgium are discussed in their relation to the distribution and adaptation of plants. The article is illustrated with detailed soil maps of the districts.

Soils of Roumania (*Rev. Sci.* [*Paris*], *49* (*1911*), *I*, *No. 16*, *pp. 503, 504*).—This article, which refers to a continuation of studies of soils of Roumania by Murgoci (E. S. R., 23, p. 315), is based upon a geological soil map published by the Geological Institute of Bucharest. It gives the results of mechanical and chemical analyses of different steppe, forest, residuary, and alluvial soils of the region, as well as of studies of their distribution and agricultural value. Particular attention is called to variations in the humus content of the soils. In the chernozem soils east of Moldavia and Muntenia the humus content was from 4 to 6 per cent, in the chestnut-colored soils of the southeast 4 per cent, in the yellow or light-brown soils along the Danube 2 per cent, and in the cultivated steppe soils it was very low.

Surrounding Bucharest and central Moldavia there occurs a ferruginous soil with 2 per cent humus. It is reported to contain a sort of hardpan (ortstein) stratum of ferromagnesic concretions from 10 to 15 cm. (3.94 to 5.91 in.) below the surface.

The manganese content of Italian soils, A. Contino (*Staz. Sper. Agr. Ital.*, *44* (*1911*), *No. 1*, *pp. 51–55*; *abs. in Chem. Zentbl.*, *1911*, *I*, *No. 18*, *p. 1374*).—The literature relating to the occurrence of magnanese in the soils and ash of plants is reviewed and determinations of manganese in a large number of Italian soils are reported. The method used in the determination is described. The amount of manganese found (calculated as Mn_3O_4) varied from 0.03 to 0.48 per cent, with an average of 0.17 per cent.

Soil conditions of German East Africa, V. Lommel (*Pflanzer*, *7* (*1911*), *No. 4*, *pp. 221–227*).—In this article the author discusses the origin, extent, and importance of the different soil types of this region, which are classed as sands, red loam, volcanic soils, and alluvial soils.

Soils of Java, E. C. J. Mohr (*Teysmannia*, *20* (*1909*), *Nos. 8*, *pp. 486–490*; *10*, *pp. 621–631*; *11*, *pp. 679–686*; *12*, *pp. 757–772*; *21* (*1910*), *Nos. 2*, *pp. 79–91*; *4–5*, *pp. 238–250*; *6*, *pp. 355–364*; *9*, *pp. 578–595*; *10*, *pp. 638–654*; *11*, *pp. 701–712*; *12*, *pp. 747–752*).—The work here reported deals with the classification of Java soils, based on a study of the parent rock, climate, and weathering processes. It includes under residuary types the red laterite, yellow laterite, light, dark brown, and alkali soils, and under secondary or transported types soils formed by rivers, seas, and wind.

From the observations the following relations between climatic conditions and soil types were noted: Low countries having hot climates, much sunshine, and wet seasons give rise to red laterite soils, whereas countries with similar climates and amount of sunshine but with alternating wet and dry seasons form dark soils. With continued dry seasons alkali soils are formed.

Rugged countries with cloudy, moderately warm, and wet conditions give rise to the yellow laterite soils, whereas countries with the same cloudy conditions and temperature but with alternating wet and dry seasons form dark brown soils. High rugged regions where cool and wet conditions prevail give rise to a soil consisting of a white weathered mass covered with a dark humus layer.

Two compounds isolated from peat soils, C. S. Robinson (*Jour. Amer. Chem. Soc.*, *33* (*1911*), *No. 4*, *pp. 564–568*; *abs. in Jour. Chem. Soc.* [*London*], *100* (*1911*), *No. 588*, *II*, *p. 431*).—The isolation of leucin and isoleucin from peat soils is reported.

Soil formation and the importance of geological-agronomical maps for fruit culture, Lienau (*Ber. Landw. Reichsamte Innern* [*Germany*], *1910*, *No. 17*, *pp. 37–44*).—This is a lecture delivered before the German Pomological

Society in which the author discusses the influence of the chemical composition, humus content, and physical properties of the soil on the character of its vegetation. Particular attention is given to the geological formation of different rocks and their subsequent decomposition and soil formation through the action of weathering agents, with special reference to the soils of northern Germany.

The author emphasizes the fact that it is exceedingly difficult, or even impossible, to draw definite conclusions regarding the final soil product from a knowledge of the parent rock alone. The position is therefore taken that geological agronomical maps are of great practical importance in fruit growing as well as in all kinds of farming in that they deal not only with the geological aspect of the soil but also with its physical and chemical properties and plant adaptations.

Some of the more important soil maps applicable to Germany are briefly noted.

The mechanical analysis of arid soils, W. Beam (*Cairo Sci. Jour., 5 (1911), No. 56, pp. 107–119, fig. 1*).—The author made a study of different methods of mechanical analysis used by other investigators with a view to adapting them to the analysis of arid soils.

The method advocated by the Bureau of Soils of this Department appeared to be the most promising, but trials with arid soils showed that it failed, as did most of the other methods, to separate a very considerable portion of the clay, which goes to swell the silt and other fractions.

Further tests were made of the clay content of arid soils as affected by length of time of agitation, adding varying amounts of sodium carbonate, with and without heat, and the height of the liquid in subsidence, together with a study of the size of clay particles, the silt content, and the classification of soil particles.

The method of mechanical analysis of soils finally adopted and used with success at the Khartum laboratories is described. The essential points of this method are the use of from $\frac{1}{20}$ to $\frac{1}{8}$ gm. of sodium carbonate in 100 cc. of water and the use of a brush in puddling. Boiling with dilute sodium carbonate without the use of the brush not only required double the number of decantations to effect a separation of the clay, "but the sum total of clay removed was 51.5 per cent as against 54 per cent by the use of the brush."

Separation of the clay by means of the centrifugal machine was found to be more rapid, but required much more of the operator's attention.

The author calls attention to the fact that although the proposed method is recommended especially for arid soils, "it is equally suitable for those of humid regions. Further, it is held that a method of this kind should invariably be used, since otherwise the comparison of humid with arid soils becomes impossible. It must be recollected also that the treatment by acid not only results at times in the complete solution of the larger particles, but invariably in the extraction of material from the finer constituents, so that as a method of 'mechanical' analysis it can not but be considered scientifically unsound."

Observations on the moisture of sandy soils, A. J. Suprunenko (*Zap. Novo-Aleksandri. Inst. Selsk. Khoz. i Liesov., 21 (1910), No. 1, pp. 1–14; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 2, pp. 279, 280*).—This article reports the results of experiments bearing on the moisture content for different depths of typical sandy soils of Novo-Alexandria, in relation to the rainfall and the kind and stage of growth of crop.

The minimum loss by evaporation was observed in August at a depth of 75 cm. (about 29.55 in.) in a soil where oats were grown.

The penetration of the water was most rapid in the soil where vetch was grown. Where potatoes and rye were grown the moisture was noticeably constant during the first period of vegetation. After harvesting, however, the potato soil lost the water with much greater rapidity.

The penetration of rainfall in the soil was found to be comparatively rapid, in some cases reaching a depth of 125 cm. (about 49.25 in.) within 7 days after rains occurred.

Soil moisture, J. CASCÓN (*Bol. Agr. Téc. y Econ., 3* (*1911*), *No. 29, pp. 464–485, dgms. 3*).—This article reports and briefly discusses the results of tests conducted at Palencia, Spain, bearing on the moisture of different soils in relation to fallowing, cultivation, and kind of crop grown. Observations on rainfall and evaporation from February to June, inclusive, during 1908, 1909, and 1910, are also reported.

The absorption of aqueous vapor from the air by soils, E. PACHECO (*Asoc. Españ. Prog. Cien. Cong. Zaragoza, vol. 4, pt. 1, pp. 161-169; abs. in Geol. Zentbl., 15* (*1910*), *No. 8, pp. 386, 387; Wasser u. Abwasser, 4* (*1911*), *No. 1, p. 22*).—Referring to the observation by geologists that more water is annually evaporated from the soil than falls in the form of rain, the author attempts to explain how this deficiency is made up and maintains that it is done by direct absorption of the aqueous vapor of the air by the soil. He cites a number of cases (Canary Islands and Estremadura) of maintenance of vegetation by water from this source in regions where almost no rain falls.

Biological-chemical processes in the soil, W. MOOSER (*Landw. Vers. Stat., 75* (*1911*), *No. 1-2, pp. 53-106; abs. in Jour. Chem. Soc.* [*London*], *100* (*1911*), *No. 584, II., p. 530*).—The author reviews the work of other investigators bearing on the subject and reports the results of experiments on the influence of calcium carbonate, benzoic acid, and cresol on nitrification, loss of ammonia from increased application of lime, formation of nitrates in sterilized soils and in washed soils without addition of ammonia, and on the "dephenolizing" power of soils as determined by its action on paracresol and as affected by temperature of the soil and period of application of the cresol.

Among the more important results obtained it is noted that the benzoic acid exerted a depressing influence on nitrification in the soil and that on the other hand the presence of alkalis, in not too large quantities, tended to neutralize this effect.

The application of cresol at first inhibited nitrification, but after a period of 30 days the formation of nitrates was the same for soils with and without application of cresol. It is believed that the bacterial activity does not cause the formation of nitrates, but that there is another oxidation process which in the case of the cresol soils attacked and changed into other forms the abundant and finely divided carbon compounds, after which the normal process of oxidation of ammonia is resumed. It appears that the changing of the cresol was considerably influenced by the temperature, no energetic reduction setting in under 35° C. The author suggests that an explanation of this "dephenolizing" power of soils be looked for in a study of enzymotic and catalytic agents.

Production of acids and alkalis in the soil, A. D. HALL and N. H. J. MILLER (*7. Internat. Cong. Appl. Chem.* [*London*], *1909, Sect. VII, pp. 17, 18; abs. in Jour. Chem. Soc.* [*London*], *100* (*1911*), *No. 583, II, pp. 429, 430*).—This article is based upon experiments at Rothamsted, showing that a long-continued application of ammonium salts resulted in the accumulation of free mineral and humus acids in soils deficient in calcium carbonate, to such an extent that nitrification was interfered with and nitrogen was assimilated in the form of ammonia. On the other hand, continued application of sodium nitrate produced an alkaline reaction and puddling of the soil.

On the fixation of phosphoric acid by the organic matter of the soil, A. PETIT (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 20, pp. 1317–1319; abs. in Rev. Sci.* [*Paris*], *49* (*1911*), *1, No. 21, pp. 667, 668; Chem. Zentbl., 1911, II, No. 3, pp. 157, 158; Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 5, p. 1038*).—The author concludes from his experiments that in soils very rich in organic matter, such as the forest soils with which he experimented, the fixation of phosphoric acid by humus was so small as to be negligible. The same was true of humus extracted from soils by ordinary methods.

Changes induced by the addition of carbohydrates to soils, H. B. HUTCHINSON and F. S. MARR (*7. Internat. Cong. Appl. Chem.* [*London*], *1909, Sect. VII, pp. 37–40; abs. in Jour. Chem. Soc.* [*London*], *100* (*1911*), *No. 583, II, pp. 430, 431*).—Experiments are referred to in which, when starch was applied at the rate of 1 ton per acre, the yield of barley was decreased 17.45 per cent, and an equal application of sucrose resulted in a decrease in the yield of 31.2 per cent. An examination of the soil showed a greatly increased growth of bacteria and molds. In culture tests it was found that 2 per cent of starch and dextrose increased the growth of bacteria and molds, but that mannitol did not produce this result.

Sewage sickness in soil, and its amelioration by partial sterilization, E. J. RUSSELL and J. GOLDING (*Jour. Soc. Chem. Indus., 30* (*1911*), *No. 8, pp. 471–474*).—Examinations of samples of soil which had become "sick" and more or less bacterially inactive as a result of continuous application of sewage showed that prolonged aeration under very favorable conditions did not restore the bacterial activity, but that partial sterilization by heat, carbon bisulphid, or toluol did bring about this result. The authors attribute the difficulty to the presence in the sewage-sick soils of large numbers of organisms which feed upon the bacteria to which sewage purification is due. The number of bacteria in partially sterilized soils rose to over 400,000,000 per gram, while in untreated soil they only occasionally reached 40,000,000. It was found that destructive organisms, including amœbæ, *Vorticella putrina*, Euglena, and others, which are found in ordinary soils, were also present in the sewage-sick soils and were much more active there than in ordinary soils. These organisms were not killed by aerating, liming, or resting the soil, but were destroyed by heating and application of carbon bisulphid and toluol. Sewage-sick soils so treated were more effective as filters than untreated soils and did not so quickly lose their efficiency.

Carbon bisulphid as a soil improver, C. J. J. VAN HALL (*Teysmannia, 22* (*1911*), *No. 2–3, pp. 152–162*).—This is a brief review of investigations bearing on this subject with references to the principal literature.

Conservation of the purity of the soil, H. L. BOLLEY (*Proc. Soc. Prom. Agr. Sci., 31* (*1910*), *pp. 100–106*).—As in previous articles (E. S. R., 24, p. 132) the author maintains that there are large areas of wheat soils of the Northwest which have declined in productiveness as a result of contamination with disease-producing parasites and in this respect are analogous to old flax-cropped lands. "Constant cropping has carried to the soil the various types of parasites which the wheat crop and flax crop are heir to."

The influence of the soil on plant growth, S. T. PARKINSON (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 258–261, pl. 1*).—This is an account of comparatively simple tests to show the character of growth made by carrots on different types of soil, including peat, loam, clay, sand, and chalk. The experiments were made in pits filled with the soils.

The economical maintenance and development of soil fertility, C. E. THORNE (*Bien. Rpt. Tenn. Dept. Agr., 1909–10, pp. 284–300*).—This article describes the system of rotation, the use of manure reenforced with ground rock phosphate, growth of clover, and application of lime and commercial fertilizers followed at the Ohio Experiment Station in increasing the productiveness of the soil.

The development of the use of manures and fertilizers, F. SCHACK (*Verhandl. Naturw. Ver. Hamburg, 3. ser., 17 (1909), pp. LXV–LXVII*).—The author concisely reviews the development of the use of manures and fertilizers from the earliest ages to the present time, and in conclusion points out that the object sought in the use of fertilizers, according to Liebig's theory, should be to find the optimum amount of fertilizer to use with each soil and to avoid the use of anything more than this.

Stable manure and green manuring, SCHNEIDEWIND (*Ber. Landw. Reichsamte Innern [Germany], 1910, No. 17, pp. 69–77*).—This article, based upon experiments at Halle, deals with the composition, deterioration, and preservation of manure, and the effect of stable manure and of green manures on different crops.

The results indicate that the most profitable returns can be obtained in the case of root crops only by the use of manure with commercial fertilizers. About 25 per cent of the nitrogen of the manure was found to be utilized in the course of two years. It was thought that the beneficial effect of the manure was due to a considerable extent to the potash and phosphoric acid which it contained.

Green manures were found to give best results on light soils poor in humus and nitrogen. The crops which appeared to be best suited to culture with green manures were beets, potatoes, and oats. The sugar content of beets was slightly depressed by green manures, but to a less extent than by stable manure. The effect of the green manures on potatoes was very variable, but they were less beneficial than stable manure. The beneficial effect of the green manures was increased by thorough cultivation. Oats made a most decided response to green manures.

The Halle experiments indicate that green manures should not be plowed under deeper than 25 cm. (about 9.85 in.). On light soils they should be plowed under in late fall, winter, or early spring, while on better soils they give best results when plowed under before frost in the fall. In the case of light soils early plowing under is likely to result in loss of nitrogen. It was found profitable to use a small amount of nitrate of soda in addition to green manure on light soils, and on all soils a basal fertilizer containing potash and phosphoric acid is recommended

The deterioration of manures under semiarid conditions, W. P. HEADDEN and E. DOUGLASS (*Colorado Sta. Bul. 168, pp. 32*).—This bulletin is based upon examinations of a large number of samples of sheep and cattle manure of various ages and kept under different conditions of moisture and exposure.

The main facts brought out in the bulletin are that manure under arid conditions does not lose weight as rapidly as in more humid regions. Sheep manure lost 32.5 per cent in weight in about 15 months and 56.7 per cent in a little over 2 years. Such manure normally contains about 13 per cent less moisture than in moist climates.

The phosphoric acid decreased 42 per cent in 15 months and 59 per cent in 2 years, the loss in phosphoric acid agreeing quite well with the loss in weight.

Manures in semiarid regions differ most decidedly from those of humid climates in percentage of potash. Probably as a result of the light rainfall, manures do not lose potash in dry climates, no loss of this constituent being observed in these experiments during the first 15 months. That this was not due to insolubility of the potash in water was shown by experiments in which air-dried sheep manure lost 43.7 per cent of potash, 22.6 per cent of phosphoric acid, and 89 per cent of nitrogen when washed with water. In the series of samples examined the potash, calculated on the basis of dry matter in the manure, increased from an average of 4.4 per cent in fresh manure to 6.3 per cent in one-year-old samples, remaining at this figure for several years. The phosphoric acid remained at about 1 per cent of the dry matter irrespective of the age of the manure.

There was a large loss of nitrogen during the first 2 years, mainly as a result of escape of free ammonia. Nitrogen as nitrates varied widely. Some of the older manures carried large amounts of nitrates while others of the same age contained almost none. The percentages of carbon and hydrogen in the manures were practically constant and were apparently not affected by age.

With the exception of insoluble ash, which increased with age, and free ammonia and nitrogen, which decreased with age, there was remarkable uniformity in composition, indicating that under the conditions of these experiments the manure was broken down by bacterial life at about the same rate that leaching carried away the soluble salts.

Recent investigations on the loss of nitrogen from manure, VOGEL (*Illus. Landw. Ztg., 31 (1911), No. 40, pp. 389, 390*).—The results of several recent investigations on this subject are briefly summarized.

The theoretical basis for the use of commercial fertilizers, F. K. CAMERON (*Jour. Indus. and Engin. Chem., 3 (1911), No. 3, pp. 188–191*).—"In this paper it is pointed out that: (1) Crop production is the result of many factors, natural and artificial, and these factors are all mutually dependent. (2) No simple theory of fertilizer action can satisfactorily account for the known facts. (3) With intensive methods of cultivation, fertilizers are effective on all kinds of soils, and are the more efficient on the naturally better soils. (4) Other materials than those containing the traditional plant foods may yet become valuable fertilizers, if they satisfy commercial requirements."

Applied electrochemistry, M. DEK. THOMPSON (*New York, 1911, pp. XII+329, figs. 137*).—The portion of this book of special agricultural interest is the chapter on fixation of atmospheric nitrogen, which describes the preparation of calcium cyanamid, the oxidation of the nitrogen of the air, and the synthesis of ammonia, the three general methods of fixing atmospheric nitrogen now in operation.

Recent progress in the fixation of atmospheric nitrogen, J. B. C. KERSHAW (*Elect. World, 57 (1911), No. 17, pp. 1035–1038, figs. 5*).—It is stated that there was considerable progress during 1910 in the industrial development of furnaces and processes for the fixation of atmospheric nitrogen. "It is estimated that 100,000 horsepower is already applied to these processes of manufacture, and that by the end of 1911 this total will be more than doubled." Several of the newer manufacturing plants are described and the efficiency of the different processes is discussed.

The industrial fixation of atmospheric nitrogen, E. LAMY (*Soc. Ingén. Civ. France Bul., 1910, No. 7, pp. 61–86, figs. 6; abs. in Metallurg. and Chem. Engin., 9 (1911), No. 2, pp. 99–104, figs. 2; Ztschr. Elektrochem., 17 (1911), No. 11, p. [illegible]*).—The principal processes employed in the fixation of atmospheric nitrogen are discussed, particularly the Pauling process as in operation at Notre-Dame de Briançon, France.

Hydro-electric plants in Norway and their application, A. SCOTT-HANSEN (*Abs. in Mark Lane Express, 105 (1911), No. 4154, p. 635; Chem. Trade Jour.,* *48 (1911), No. 1251, pp. 454, 455).*—An abstract is given of a paper read before the Faraday Society, dealing especially with the manufacture of nitrogen compounds from the air and showing the growth of this industry in Norway and elsewhere. It is stated that during the past year from 170,000 to 180,000 horsepower was used in the manufacture of nitrates (including nitrates of calcium, sodium, and ammonium) and 20,000 horsepower in the manufacture of calcium cyanamid.

The preparation of a stable calcium cyanamid (*German Patent No. 225,179; abs. in Ztschr. Angew. Chem., 23 (1910), No. 48, pp. 2279, 2280; Internat. Inst. Agr. [Rome]. Bul. Agr. Intel. and Plant Diseases, 1911, No. 1, p. 67*).—A process of mixing calcium cyanamid with small quantities of fatty substances to improve its mechanical condition and prevent absorption of water and decomposition is described.

Tests of nitrite in pot and field experiments, B. Schultz (*Fuhling's Landw. Ztg., 60 (1911), No. 10, pp. 346–351*).—In comparative tests of calcium nitrite, calcium nitrate, and sodium nitrate it was found that the yield of cereals was reduced to a marked extent in the case of calcium nitrite. The author concludes, therefore, that nitrite is an objectionable constituent of commercial calcium nitrate for fertilization purposes.

The fertilizing value of so-called nitrammon-lime, II, H. G. Söderbaum (*K. Landtbr. Akad. Handl. och Tidskr., 50 (1911), No. 4, pp. 335–351, figs. 6*).—In continuation of previous experiments (E. S. R., 22, p. 432), the author studied particularly the after effects of this material during a second season. The effect of both phosphoric acid and nitrogen in the material was relatively small, its fertilizing value depending primarily upon its lime content.

Nitrogen and phosphorus as related to permanent agriculture, C. H. Lane (*Bien. Rpt. Tenn. Dept. Agr., 1909–10, pp. 301–307*).—This article discusses the need for nitrogen and phosphorus in middle Tennessee soils as indicated by cooperative fertilizer experiments.

Texas phosphates, W. D. Hornaday (*Amer. Fert., 34 (1911), No. 8, p. 46*).—This is a brief note referring to reported discoveries of a large deposit near Austin, Texas.

Possible sources of potash, H. Erdmann (*Abs. in Engin. and Min. Jour., 91 (1911), No. 21, p. 1044*).—The author dismisses the salt deposits of France, Austria, the Caspian region in Russia, and those of Tibet as unimportant on account of the small percentage of potash present, but attributes greater importance to the salt deposits of northwestern Mexico, Arizona, and the Salton Sea region of southern California, which he estimates to contain at least 200,000,000 tons of potassium chlorid. A certain amount of potash may also be obtained as a by-product of the sodium nitrate industry of Chile. On the whole, however, the author thinks "no considerable foreign competition threatens the German potassium industry in the near future."

Potash fertilizers, F. Brunerie (*Jour. Agr. Prat., n. ser., 21 (1911), No. 5, pp. 141–143*).—Summarizing the results of 5 years' field experiments, the author concludes that the use of potash salts was profitable on a soil containing 0.01 per cent of potash and 0.008 per cent each of nitrogen and phosphoric acid and with a variety of crops.

A new method of using potash salts and other fertilizers, L. Hiltner (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 19, pp. 231–233*).—This article gives the results of comparative tests of kainit, calcium nitrate, magnesium sulphate, ferrous sulphate, milk-of-lime, humus, and various other substances applied to the above-ground portion of potatoes and other crops, which indicated a marked fertilizing effect from several of these substances applied in this way. In other experiments potassium chlorid, sulphate, and phosphate were applied to the soil and painted upon the leaves of the plant. In the majority of cases better results were obtained by the latter method of application than by the former. The author urges further investigations along this line.

The rational use of lime, W. P. Brooks (*Massachusetts Sta. Bul. 137, pp. 3–6*).—This article discusses briefly the possible effects of liming, how to determine what soils need liming, the relation of lime to crops, and methods of supplying lime.

The distribution, composition, and cost of lime, H. D. Haskins and J. F. Merrill (*Massachusetts Sta. Bul. 137, pp. 7–19*).—This article gives information regarding the sources of lime in Massachusetts, the composition of different forms of lime, and analyses and valuations of samples of commercial lime. The kinds of lime suited to different conditions are indicated.

Lime: Its properties and uses (*U. S. Dept. Com. and Labor, Bur. Standards Circ. 30, pp. 22*).—This circular deals with methods of manufacture, properties, and use of lime as a building material, in chemical industries, and in agriculture. Methods of testing lime are briefly referred to. The essential facts regarding the use of lime as a fertilizer are concisely summarized from publications of this Department and the state experiment stations.

Action of sulphur as a fertilizer, E. Chancrin and A. Desriot (*Jour. Agr. Prat., n. ser., 21 (1911), No. 14, pp. 427–429; abs. in Engrais, 26 (1911), No. 25, pp. 684, 685, Rev. Gén. Sci., 22 (1911), No. 10, pp. 392, 393*).—The authors refer to experiments made in Germany in 1909[a] in which it was found that the use of sulphur for potato diseases was not only effective in reducing the disease but increased the yield of potatoes, and report experiments of their own in which sulphur was used at rates of from 250 to 500 kg. per hectare (about 223.14 to 446.28 lbs. per acre) in connection with superphosphate, potassium sulphate, and sodium nitrate on potatoes and beets. In all cases there was a decided increase in the yield of potatoes on the plats receiving sulphur, and in every case except one there was an increase in yield of beets following its application.

While the authors do not attempt general conclusions from these experiments, they suggest that the beneficial effect of the sulphur may be due to action similar to that of partial sterilization by heat, carbon bisulphid, toluene, etc.

Sulphur requirements of farm crops in relation to the soil and air supply, E. B. Hart and W. H. Peterson (*Wisconsin Sta. Research Bul. 14, pp. 21*).—This bulletin describes an improved method of determining sulphur in soils (fusion with sodium peroxid) and gives compiled and original data on the amounts of sulphur in feeding stuffs, in soils under different conditions, removed from soils by crops and lost in drainage, and added to soils by precipitation and in manure.

It is shown that "normal soils are relatively poor in total sulphur trioxid; a limited number of analyses showed a percentage content of from 0.033 to 0.140; most of them contained less than 0.10 per cent. An acre-foot will contain from 1,000 to 3,000 lbs. of total sulphur trioxid. About the same quantity of phosphorus pentoxid will be found in an acre-foot of normal soil. These results for sulphur trioxid are based on analyses made by the method of fusion with sodium peroxid. Determinations by extracting with hydrochloric acid or with nitric acid and bromin will not give the total sulphur content of soils. Soils cropped from 50 to 60 years and either unmanured or receiving but slight applications during that period have lost on the average 40 per cent of the sulphur trioxid originally present as determined by comparison with virgin soils.

[a] Deut. Landw. Presse, 37 (1910), No. 18, p. 204.

"The sulphur content of a number of . . . common farm products . . . is much larger than found by Wolff in the ash from such products.

"The amount of sulphur trioxid removed by crops is considerable, being equal in the case of average crops of cereal grains and straws to about two-thirds of the phosphorus pentoxid removed by these crops; the grasses of mixed meadow hay remove quite as much sulphur as phosphorus, while the legume hays may approach, and in the case of alfalfa, even exceed in this respect. Members of the Cruciferæ, as the cabbage and turnip, are heavy sulphur-using crops and may remove two to three times as much sulphur trioxid as phosphorus pentoxid. An average acre crop of cabbage will remove about 100 lbs. of sulphur trioxid."

It is estimated that the gain from precipitation in the region of Madison does not amount to more than 15 to 20 lbs. per acre annually, while the loss in drainage amounts to about 50 lbs. per acre yearly.

"The fact that common crops remove from the soil considerable quantities of the element sulphur, while the compensating factor of supply from the atmosphere is very probably offset by the losses which the land sustains by drainage, makes it apparent that for the maintenance of a permanent supply of sulphur in the soil, this element must be added systematically either as a constituent of commercial fertilizers, or with the farm manure."

The method used in the determination of sulphur in soils was as follows:

"Ten gm. of soil were placed in a 100 cc. nickel crucible, moistened with water, about 10 gm. of a weighed 20 gm. portion of sodium peroxid added, and the mixture thoroughly stirred with a platinum rod. The crucible was placed over an alcohol flame and heated moderately until the mass was dry. The remainder of the sodium peroxid was then added, the cover placed on the crucible, strong heat applied until the mass melted, and kept in this condition for 10 minutes. It was then allowed to stand over a lower flame for 1 hour. The crucible was removed, cooled, placed in a 600 cc. casserole, hot water added and the fused mass removed. It was neutralized with hydrochloric acid and then further acidified with 10 cc. of hydrochloric acid. The volume was made up to about 450 cc. and boiled for 15 minutes, or until no undecomposed portion of the fused mass remained on the bottom. The covered casserole was allowed to stand on the steam bath over night, filtered through a 'nutsche' and the residue thoroughly washed with successive small portions of hot water. The filtrate and washings, if over 500 cc., were evaporated below that volume, refiltered, and the volume made up to 500 cc. Aliquots of 250 cc. each were heated to boiling, barium chlorid added, boiled for 5 minutes, and set aside on a steam bath for 24 hours. The volume was not allowed to decrease as silicic acid may be precipitated if much evaporation takes place. After standing for this length of time the barium sulphate was filtered off, washed, ignited and weighed. In the determinations made by this method the precipitate was free from silica as demonstrated by the hydrofluoric acid test."

This method gave considerably higher results than the official method and somewhat higher than the nitric-acid-bromin method (modified) of Van Bemmelen.

The sulphur requirements of farm crops in relation to the soil and air supply, E. B. Hart and W. H. Peterson (*Jour. Amer. Chem. Soc., 33 (1911), No. 4, pp. 549–564; abs. in Jour. Chem. Soc.* [*London*], *100 (1911), No. 583, II, p. 431*).—This is an account of the investigations noted above.

Catalytic fertilizers in the culture of beets, G. Bertrand (*Rev. Sci.* [*Paris*], *49 (1911), I, No. 22, pp. 673–680*).—The author shows the general distribution of manganese in plants and maintains that this substance is essential to the oxidizing action of oxydases, laccases, etc., which in turn is essential to the vital processes of the plant, and he reports experiments showing that manganese has a marked effect upon the growth of *Aspergillus niger*, oats, and beets. Similar effects have been observed in the case of aluminum, boron, iron, zinc, and the like, and this is attributed by him to catalytic action.

The use of kelp and rockweed as a fertilizer (*Maritime Farmer, 16 (1911), No. 17, pp. 623, 624*).—This article discusses briefly the source of supply and the best methods of using kelp and rockweed as a fertilizer in Newfoundland. The material is considered a valuable fertilizer resource for the region.

Value of tobacco juice residues as manure (*Bol. Tec. Coltiv. Tabacchi [Scafati], 9 (1910), No. 6, p. 349; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 1, p. 65*).—Analyses are reported showing that the pressed tobacco extract examined in this case contained dry matter 67.5 per cent, phosphoric acid 0.24 per cent, potash 0.22 per cent, and nitrogen 0.96 per cent.

Purchasing a fertilizer, R. C. THOMPSON (*Arkansas Sta. Circ. 11, pp. 4*).—This circular attempts to explain briefly "a means of telling which fertilizers are the cheapest to buy," and as illustrating the importance of the matter the author states that "in some instances farmers pay as high as 36 cts. a pound for nitrogen in a low grade fertilizer when they could just as well buy a higher grade fertilizer in which the nitrogen costs only 26 cts. per pound."

Commercial fertilizers, E. FULMER (*Washington Sta. Popular Bul. 37, pp. 4*).—This gives a brief summary of facts relating to the use and inspection of fertilizers, more fully presented in Bulletin 98 of the station (E. S. R., 25, p. 219).

Commercial fertilizers, W. J. JONES, Jr., ET AL. (*Indiana Sta. Bul. 151, pp. 59–163, fig. 1, map 1*).—This bulletin gives the results of analyses of fertilizers inspected in Indiana during 1910, comparing the general results with those obtained in previous years. The text of the state fertilizer law is also given, with notes on the requirements of the law as related to manufacturers, agents, dealers, and consumers. It is estimated that 151,865 tons of fertilizer, valued at $3,695,492, was sold in Indiana in 1910.

Analyses of commercial fertilizers, M. B. HARDIN ET AL. (*South Carolina Sta. Bul. 154, pp. 56*).—This bulletin contains the results of analyses and valuations of 1,188 samples of fertilizers examined during the season of 1909–10.

Terms used in the chemical fertilizer trade and superphosphate industry (*Saaten, Dünger u. Futtermarkt, 1911, No. 25, pp. 693–696*).—The terms agreed upon for the designation of fertilizer compounds and mixtures by the German Agricultural Council and the Association of German Fertilizer Manufacturers are given.

AGRICULTURAL BOTANY.

Translocation of plant food and elaboration of organic plant material in wheat seedlings, J. A. LE CLERC and J. F. BREAZEALE (*U. S. Dept. Agr., Bur. Chem. Bul. 138, pp. 32, figs. 2*).—The results of a study of wheat seedlings grown for 2 weeks in water cultures, to different series of which sodium nitrate, potassium sulphate, potassium chlorid, and sodium phosphate were added, are given, showing the changes taking place in inorganic and organic constituents.

The authors found that the nitrates are taken up somewhat more readily than phosphates, but not nearly to the extent that potash is absorbed. There is apparently a selective absorption on the part of the plants, large amounts of potash being assimilated. This is brought about by the immediate requirements of the plants for a large amount of potash for the proper exercise of their physiological functions.

In the changes of organic constituents analyses were made for ether extract, fiber, pentosans, and sugars before and after inversion. The largest amount of ether extract was elaborated by the seedlings grown in nitrate and in phosphate solutions. The percentage of fiber in the axes of the plant was approximately the same, irrespective of the kind of solution in which the plants were grown. In the case of the pentosans, at the end of the fifteenth day there was a somewhat larger amount in the axes of plants grown in nutrient solutions than in the control, but in the results obtained it does not appear that nitrates form any larger amount of pentosans than is formed by potash or phosphoric acid.

During the process of growth the formation of reducing sugar in the seed was found to increase rapidly up to the fifth or sixth day; after this time there was a rapid falling off in the reducing sugars until at the end of 15 days there was but a trace of this substance in the residual seed. In the axes, however, reducing sugars increased up to about the ninth day, when they contained about 3 times as much of the sugars as the original seed did of hydrolyzable sugar. After this period there was a gradual decrease of reducing sugars, even in the axes, until the fifteenth day, when the amount present approximated that of the hydrolyzable sugar originally present in the seed. The total amount of hydrolyzable sugar never exceeded that originally found in the seed, indicating that either the hydrolyzable sugar is translocated as such from the seed or that it is hydrolyzed before translocation occurs. No reducing sugar was present at the beginning, but on the fifth day it had increased to twice the total hydrolyzable sugar originally present. Whether the sugars found in the axes are due entirely to the hydrolysis of the starch of the seed and subsequent translocation into the axes, or whether a part of these sugars was a result of assimilation, was not determined.

On the biochemical side of carbon dioxid assimilation by green plants, V. GRAFE (*Biochem. Ztschr., 32 (1911), No. 2, pp. 114–129*).—This is a general discussion of the photosynthetic process, especially with reference to the presence, origin, and use of formaldehyde in green plants. It contains a review of various investigations and experiments on this subject and on the effect of formaldehyde on green plants (E. S. R., 25, p. 434).

The selective power of plants for dextrose and levulose, L. LINDET (*Bul. Soc. Chim. France, 4. ser., 9 (1911), No. 9, pp. 425–429*).—Previously noted from another source (E. S. R., 25, p. 326).

On the rôle of nucleoprotein in plants, W. ZALESKI (*Ber. Deut. Bot. Gesell., 29 (1911), No. 3, pp. 146–155*).—In a study of this subject the author determined the amount of nucleoprotein in the leaves of Tilia taken in different stages of growth, in the etiolated seedlings of *Zea mays* in different stages of germination, in the seeds of *Vicia faba* germinated in darkness, in the etiolated seedlings of wheat in various stages of growth, and in other plants.

From these investigations the conclusion is reached that nucleoprotein consists of formative material which takes part in the building up of the protoplasts of the plants.

The physiological importance of manganese and of aluminum in the vegetable cell, J. STOKLASA (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 20, pp. 1340–1342*).—The author gives the results of experiments on plants grown in liquid cultures and in pots of certain amounts of salts of manganese and aluminum. When 1/2,000 of the atomic weight in grams of manganese and of aluminum was added to culture media the plants made the highest yields, and of all the organs of the plants the leaves showed the largest quantities of both salts. It is, therefore, believed that these 2 elements not only take part in assimilation processes, but may also play an important rôle in the photosynthetic process.

On the movements of the metabolic products of the leaf through uninjured, chloroformed, and plasmolyzed petioles, N. T. Deleano (*Jahrb. Wiss. Bot.* [*Pringsheim*], *49* (*1911*), *No. 2, pp. 129–186, figs. 9*).—A study is reported of the time necessary for the complete disappearance from the leaf tissues of the primary starch formed by photosynthesis, and of the route of the unused foodstuffs in their journey through the leaf stem or petiole, as indicated by experiments with uninjured, chloroformed, scalded, and plasmolyzed petioles.

It was found that in uninjured leaves the starch entirely disappeared in from 33 to 46 hours, and that not only carbohydrates but other metabolic products passed out of the leaves, the carbohydrates being 1.06 per cent of the fresh substance and the noncarbohydrates 1.63 per cent. The experiments indicated that the bulk of the metabolic products usually passed through the central fibrovascular system of the petioles.

Light and the behavior of organisms, S. O. Mast (*New York and London, 1911, pp. XI+410, figs. 35*).—This is an extensive study of the processes of orientation in plants and animals, especially those without eyes—that is, as to how these organisms regulate their activities so as to bend or move toward or from the source of stimulation.

The text is divided into 4 parts, viz, an introduction and historical review concerning the origin and development of disease and theories regarding movements in plants and animals, with special reference to the question of tropisms; experimental data and discussions bearing on the question as to how organisms bend or turn and move toward or from a source of stimulation; and general considerations of reactions to light and reactions in light of different wave lengths or colors.

Organic and functional changes of plant organs under the influence of radium, G. Fabre (*Compt. Rend. Soc. Biol.* [*Paris*], *69* (*1910*), *No. 36, pp. 523, 524*).—The author reports the results of experiments with the unopened flower buds and ovaries of Lilium when exposed to radium rays of different strengths.

It was found that the buds when subjected to strong radium rays were arrested in their development and soon commenced to dry up, while the ovaries and stigmas were completely atrophied and the anthers either did not develop completely or were greatly retarded in maturing.

A histological study of the anthers and ovaries showed that the pollen grains had either no nuclei in them, or the nuclei only incompletely developed. Sections of the stigma showed a sufficient number of pollen grains present for proper fertilization, but that no growth of the pollen grains had occurred. In the ovaries not only were the embryo sacs atrophied, but the entire ovule also.

The action of radium on plant structures, G. Fabre (*Compt. Rend. Soc. Biol.* [*Paris*], *70* (*1911*), *No. 11, pp. 419, 420*).—In a further study of this subject (see above) the author discusses the organic and functional changes that occur in plant structures after exposure to radium rays, and the influence on the germination of *Linum catharticum* of different amounts of radium bromid when present in a given amount of soil.

It was found that when Lilium rhizomes, the flowers of which had been previously subjected to radium rays, were replanted they either rotted or failed to grow, from which the author concludes that the exposure of the reproductive organs to strong radium rays will cause a general derangement of the vegetative organs.

In the experiments with *L. catharticum* a general retardation was observed in the germination and development of this plant from the presence of the radium salts in the soil. There was also an appreciable increase in the number of leaves developed on the plants subjected to the radium rays when compared with normally grown plants.

The relation of parasitic fungi to the contents of the cells of the host plants.—I. The toxicity of tannin, M. T. Cook and J. J. Taubenhaus (*Delaware Sta. Bul. 91, pp. 3–77, pls. 10*).—The authors give the results of experiments with certain fungi in which the influence of tannin on their germination and growth was tested. The fungi were grown in various media to which various percentages of tannin had been added. Three species of Colletotrichum, 8 species of Glœosporium, *Glomerella rufomaculans*, 12 species of Fusarium, several species of Ceratostomella, *Corticium alutaceum*, *Lentodium squamulosum*, 2 species of Graphium, 4 species of Cladosporium, *Alternaria solani*, *Sphæropsis malorum*, *Sclerotinia fructigena*, *Diaporthe parasitica*, *Peniophora candida*, 3 species of Penicillium, *Neocosmospora vasinfecta*, *Guignardia bidwellii*, *Septoria verbasicola*, *Ascochyta pisi*, *Cephalothecium roseum*, some undetermined species of Phyllosticta, Rhizoctonia, and Phoma, *Cladosporium macrocarpum*, Aspergillus, 3 rusts, and 1 smut were grown on certain media and the results noted.

It was found that the first action of tannin is to inhibit or check germination and finally to kill the spores. Low percentages of tannin in distilled water may stimulate germination and growth and seem apparently to serve to some extent as a food. As the maximum percentage of tannin in which spores will germinate and grow is approached, the mycelium tends to become short, thick, and very septate. Tannin has a tendency to retard or inhibit the growth of fungi. The parasitic forms are more sensitive to the action of tannin than the saprophytic ones. The majority of the parasitic fungi tested were retarded by from 0.1 to 0.6 per cent tannin. The fruiting was frequently stimulated by low percentages of tannin. The action of tannin is practically the same whether the organism is grown in agar or in liquid media.

The origin of the chloroplasts in the cotyledons of Helianthus annuus, E. C. Miller (*Bot. Gaz., 51 (1911), No. 5, pp. 378–384, pl. 1*).—After a review of the opinions of various investigators on this subject, the author gives the results of a study of *H. annuus* seedlings when grown under greenhouse conditions at a temperature of from 65 to 75° F.

From a study of the sections of the seedlings at various stages of growth the conclusion is reached that chloroplasts are present in the resting seed, but are very minute, and that as the seeds germinate these chloroplastids increase in size and multiply by simple fission, thereby giving rise to chloroplasts of the mature seedlings.

Dimorphism of the gametes of Œnothera, H. de Vries (*Biol. Centbl., 31 (1911), No. 4, pp. 97–104; rev. in Science, n. ser., 33 (1911), No. 858, pp. 897–899*).—In a series of cross-fertilization experiments with certain species of Œnothera the author found that the ovules and pollen grains carry different hereditary tendencies, for in reciprocal crosses with *O. biennis* and *O. muricata* the resulting hybrids were very unlike and strongly patrocline, showing in both instances only slight traces of any influence by the female parent. The common *O. biennis* represents the form inherited from the pollen, while the ovule characters are recessive.

This property of producing gametes having diverse hereditary qualities is termed "heterogamie" by the author. When the reciprocal hybrids of the same 2 parents are crossed, the resulting hybrids are called double reciprocal hybrids, in which, if a patrocline hybrid is crossed with the pollen of the paternal species, what the author calls iterative hybrids results, exactly like the first hybrid and very like the paternal species. If, on the other hand, a patrocline hybrid is crossed with pollen of the mother species, the resulting hybrids will have the grand-paternal species eliminated, and are called sesqui-reciprocal hybrids.

In the review of this article by W. T. Swingle the name "heterogamie" applied to this dimorphism of the gametes by de Vries is rejected as being one used in too many different senses, and the term "allogametism" is proposed in its place. Then the pollen grains and ovules of *O. biennis* and *O. muricata* would be called "allogametes."

Hereditary characters and their modes of transmission, C. E. WALKER (*London, 1910, pp. XII+239, figs. 21*).—The present volume is an attempt to apply recent discoveries as well as experimental work upon cells to some problems in heredity, thereby harmonizing the results of the Mendelian experiments with the observations of the biometricians. This the author claims to have done by showing that some parts of the cell involved in fertilization are distributed in an alternative manner, while other parts simply divide in bulk. Two classes of characters which behave in different manners in regard to inheritance are suggested, one individual and the other racial, each with a different mode of transmission.

Suggestions concerning the terminology of soil bacteria, J. G. LIPMAN (*Bot. Gaz., 51 (1911), No. 6, pp. 454–460*).—After calling attention to the general confusion existing in the terminology of the soil bacteria, the author suggests arranging the groups of these organisms according to their physiological functions.

The following grouping is suggested and its merits are discussed: Ammono- and de-ammono-bacteria, nitro- and de-nitro-bacteria, proteo- and de-proteo-bacteria, azoto- and de-azoto-bacteria, sulpho- and de-sulpho-bacteria, and ferri-bacteria; the corresponding terms are ammonification and deammonification, nitrification and denitrification, proteofication and deproteofication, azotofication and deazotofication, sulphofication and desulphofication, and ferrification and deferrification.

The influence of bacteria upon soil fertility, C. M. HUTCHINSON (*Agr. Jour. India, 6 (1911), No. 2, pp. 97–113, pls. 4*).—After a general discussion of the effects of tillage, irrigation, drainage, and manuring on the activity of certain soil bacteria, the author describes the methods in use in his laboratory to determine the reaction of soils to various agricultural operations involved in soil bacteriology. These include methods used in plating soil bacteria and in studying nitrification and ammonification in soils.

Bacteriological methods for the estimation of soil acidity, J. G. LIPMAN (*Science, n. ser., 33 (1911), No. 860, pp. 971–973*).—It is claimed that no satisfactory method has yet been found for measuring accurately the acidity of soils. The author suggests using the well-known fact that bacteria as a rule do not flourish in acid media, by inoculating neutral bouillon media with varying amounts of the acid soil under investigation and noting the resulting bacterial growth.

Preliminary experiments along these lines have demonstrated that the amount of acid present in cultivated soils may be determined quite accurately by comparing bouillon of varying reactions with equivalent quantities of neutral bouillon containing varying amounts of soil, or different quantities of soil may be added to measured amounts of bouillon, then sterilized and inoculated with a standard culture of ammonifying bacteria, and the varying amounts of ammonia given off used as a measure of the soil acidity.

The bacteriotoxins and the "agricere" of soils, GREIG-SMITH (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 7–12, pp. 154–156*).—The author gives a brief preliminary note on work done in the laboratory of the Linnean Society of New South Wales, in which the presence of bacteriotoxins in soils is investigated.

The author claims that such toxins are undoubtedly present in the soil, and that he has extracted a greater quantity from a poor soil than from a good one.

The experiments were made with *Bacillus prodigiosus* and with mixed bacteria of the same soil from which the extract tested was obtained. The toxic action was greater with *B. prodigiosus* than with the mixed soil bacteria. In other words, the latter exhibited a certain degree of immunity toward their own toxins.

It is claimed that the toxin contained in the soil is soluble in dilute saline solutions, is partially destroyed at 94° C., rapidly decays in aqueous solution, is converted by boiling into a nutrient, is destroyed by sunlight, and will decay during storage of the soil in an air-dry condition. The power of the toxins is not diminished by sodium chlorid, potassium sulphate, or magnesium sulphate solutions, as the toxic effects of extracts of soil made with a 0.5 per cent solution of these compounds were very pronounced.

It is also stated that soil particles have a protective covering of soil wax, or agricere, which consists of saponifiable and unsaponifiable residual organic matter of the soil. When disinfectants are applied to the soil, such as carbon bisulphid, chloroform, etc., their action is a double one. They kill off the less resistant bacteria, and dissolve agricere and carry it to the surface of the soil, thereby removing the waterproofing from the soil particles, and thus enabling the surviving bacteria to obtain a greater food supply. Heat, it is claimed, destroys the toxins and the less resistant bacteria, thus permiting the more resistant species to multiply very rapidly, due to the absence of the soil bacteriotoxins.

Experiments on ammonia and nitrate formation in soils, II, J. G. LIPMAN, P. E. BROWN, and I. L. OWEN (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *30* (*1911*), *No. 7–12, pp. 156–181*).—In an earlier communication (E. S. R., 23, p. 621) the authors showed that ammonia formation may serve as an index of the intensity of decomposition processes in the soil. In this paper further tests of the accuracy of this method and additional data on the decomposition of protein compounds in the soil are reported, including detailed studies on ammonia formaion from dried blood as affected by the mechanical composition of the soil, ammonia production as affected by moisture relations, the relations of lime to ammonification in soils, and the influence of chemical and physical factors on ammonia formation.

Taken as a whole, the experiments reported furnished convincing evidence, so the authors claim, as to the accuracy of the method employed, that is, of using the formation of ammonia as a criterion of the intensity of the decomposition processes in the soil.

On the rôle of nitrate reduction in the metabolism of denitrifying bacteria, O. WEGNER (*Welche Rolle spielt die Nitratreduktion im Stoffwechsel der denitrifizierenden Bakterien? Inaug. Diss., Univ. Berlin, 1910, pp. 32; abs. in Bot. Centbl., 116* (*1911*), *No. 10, pp. 267, 268*).—The experiments here reported were carred on with *Bacterium actinopelte* in culture media containing peptone, hemoglobin, and albumin as a source of nitrogen, but containing no amid substances.

The addition of galactose, levulose, and dextrose to the culture media stimulated the growth of the fungi and the reduction of the nitrates and nitrites to nitrogen. The amount of calcium nitrite in the culture media did not exceed 1 per cent, but the most intense nitrite decomposition occurred in a 0.25 per cent solution.

In the decomposition of nitrates by the bacteria 2 stages occurrred, viz, first, the change from nitrate to nitrite, and second, the reduction of the nitrites to free nitrogen and nitrous oxid. It was found that anaerobic conditions in the culture media greatly increased the nitrite reduction.

Legume bacteria, S. F. EDWARDS (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910). pp. 162, 163*).—The author reports the work done on the preparation of various cultures of nitrogen-fixing organisms for inoculating the seeds of alfalfa and other legumes, and the results of their use by various farmers. Many farmers report a greater vigor and increased yield ranging from 10 to 50 per cent from the use of the inoculated seeds.

Nitrogen-gathering plants, K. F. KELLERMAN (*U. S. Dept. Agr. Yearbook 1910, pp. 213–218, pls. 8*).—The author discusses the different groups of nitrogen-gathering organisms, the different types of root nodules, and the relation of nitrogen-fixing plants to the potential supply of nitrogen in the soil.

Three general groups of nitrogen gatherers are mentioned, viz, the anaerobic species, with Clostridium as a type, the aerobic represented by Azotobacter species, and the symbiotic root nodule bacteria. In addition to the nitrogen-gathering root tubercles of the Leguminosæ, the author lists as probable nitrogen gatherers the organisms found in the root tubercles of alder (*Alnus crispa*), *Ceanothus americanus*, *Lepargyrea canadensis*, *Eleagnus argentea*, *Ceanothus velutinus*, *Comptonia peregrina*, *Encephalartos villosus*, *E. horridus*, *Cycas seemanni*, and *C. circinalis*.

It is claimed that the economic maintenance of the agricultural nitrogen supply depends upon determining the proper rôles of these various activities, the possibilities of the control and economic enhancement of their desirable functions, and the recognition of the practical limits of biological factors in farm practice, as well as on when and how to use nitrogen fertilizers profitably.

Studies on the organisms found in the root tubercles of cycads, F. ZACH (*Österr. Bot. Ztschr., 60 (1910), No. 2, pp. 49–55*).—In addition to bacteria and an alga (*Anabæna cycadearum*) the author found in the root tubercles of *Cycas revoluta* an intracellular hyphomcete the mycelium of which becomes digested in a manner similar to that of the mycelium of the fungus in the root tubercles of Elæagnus and Sempervivum (E. S. R., 23, pp. 528, 629).

The nucleus of the infected cell becomes degenerate and the starch disappears, while there is an increased production of calcium oxalate in connection with a diminished resistance of the cell invaded by the parasite.

FIELD CROPS.

[Field husbandry experiments], S. B. MCCREADY and C. A. ZAVITZ (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 35–37, 39–42, 171–247, figs. 16*).—The work of 1909 has already been noted (E. S. R., 23, p. 332).

A statement as to the weeds which have proved most troublesome during the season 1909–10 is followed by a discussion of the remedy for field bindweed (*Convolvulus arvensis*). Among 10 weeds mentioned as recent introductions full notes are given on Rocket (*Eruca sativa*), pineapple weed (*Matricaria suaveolens*), and yellow or small alyssum (*Alyssum alyssoides*).

From several years' tests of the efficiency of iron and copper sulphate in the destruction of mustard in grain crops it is stated that both substances are successful, but that iron sulphate is the more satisfactory. On one farm a solution of 80 lbs. of iron sulphate to 40 gal. of water was applied by means of a potato sprayer with special broadcast attachment consisting of a rod about 11 ft. long with nozzles 16 in. apart. Although the mustard was very thick and the nozzles too low to allow the spray to spread sufficiently, every mustard plant was killed without injury to the oat crop.

Tables state the amount of rainfall during the 6 growing months of each of the past 11 years, the average grain yield during the past 28 years, and the average grain and straw yields during the past 12 years of field peas and each of a number of grains.

In a test of 35 varieties of oats, potatoes, and the various types of barley and wheat grown continuously on the same farm only one variety showed as high a yield during the first year of the test as during the last, while only 6 showed as high a yield during either of the first 2 years of the test as during the last. The soil changed little in fertility and no plant selection was exercised, but on the whole the average yield per acre during the latter part of the period was greater than during a corresponding period at the beginning of the experiment.

Winter wheat, barley, and corn grown on both clover and timothy sod showed average yield of 44.7 per cent greater in case of the grain grown on clover sod.

Oats, barley, spring wheat, and peas were grown for 5 years separately and in 11 different combinations of 2, 3, or 4 grains each. The average results show greater yields from the mixtures in from 90 to 95 per cent of the different tests. The highest yield of threshed grain per acre was obtained from a mixture of oats and barley, which excelled the yield of either grain grown separately by 200 lbs. Five years' tests indicate that greater yields were secured after the sowing of 1 bu. of oats and 1½ bu. of barley than when the mixture was supplemented by ½ bu. of flax, emmer, spring wheat, or hulless barley, the yield being actually decreased by the additional mixture of any one of these 4. In a 4-years' test barley and oats sown together produced the greater yield when seeded at the rate of 4 pk. of each per acre than when either was mixed in at a higher or lower rate, and produced a crop composed of 38 per cent of oats and 62 per cent of barley. The yields obtained from this mixture also excelled those obtained by sowing barley with emmer, rye, wheat, peas, or flax. Tables state some results obtained by sowing mixtures of 6 and 8 different grains made up in 2 ways, (1) by mixing equal weights of seed of all the varieties sown, and (2) by sowing the same amount of each variety that would be sown if it was being seeded separately. A very great influence on the yield was exercised by the barley, oats, and rye, a moderate effect by emmer, and a slighter effect by spring wheat, field peas, grass seed, vetches, and flax. No marked advantage was obtained by growing together different varieties of the same class of grains, as the yield obtained from the mixture closely approximated the average of the same varieties when sown separately.

In tests of various formalin, potassium sulphid, bluestone, and hot-water treatments for oat and wheat smut the greatest yields of both grains were secured from seed which had been immersed in a formalin solution for 20 minutes. Among the bluestone treatments the best results were obtained by immersing the seed for 12 hours in a solution of 1 lb. of bluestone to 25 gal. of water.

The sowing of smut-infected seed of different ages indicated that the smut spores retained their vitality longer than the grain and that the grain weakened by age was more readily attacked by the smut.

A progress report of selection and hybridization work with oats indicates good results with some varieties and crosses, and the hope that certain new varieties will soon be so constant as to justify confidence in their superior resistance to the varieties now generally grown throughout the Province of Ontario.

In a test of the stooling properties of 12 varieties of oats, the average number of stools per plant during 2 seasons ranged from 6 in case of Early White Jewel to 18 in case of Burt and 20 in case of Joanette. Joanette and Daubeney averaged 23.8 and 25.1 per cent, respectively, in hull percentage as compared with

84.6 and 88.6 per cent in case of the Early Dawson and Pioneer. In a 4-year's test of the strength of straw of 8 varieties of oats planted on low land where the conditions were favorable to lodging, the Liberty variety was comparatively free from rust and had only 43 per cent lodged when ripe as compared with 62 per cent or more in case of the Daubeney and other varieties.

During the past 7 years vetch seed obtained in Canada has yielded 2½ bu. per acre more than that which was freshly imported. A comparison is also given of the yield obtained from seed corn and seed potatoes obtained from various sources. The seed corn represented 3 strains of the White Cap Yellow Dent variety.

In tests of 25 varieties of mangels 2-years' average germination percentages ranged from 16 in case of the Yellow Globe Selected to 116 in case of the Yellow Leviathan (O. A. C.).

During the past 5 years 3 varieties of millet have been sown at intervals of about 2 weeks, beginning about May 1 and ending August 1. The highest average yield, 9.01 tons per acre of green material, was obtained from sowing on June 1.

The average alfalfa yield secured during 13 years was 21.1 tons of green crop or 5.1 tons of hay per acre.

After tests of 17 different crops and 6 different combinations during the past 15 years, the authors recommend as an annual crop for pasture the following mixture: Oats 51 lbs., Early Amber sugar cane 30 lbs., and common red clover 7 lbs. per acre.

The higher yields obtained in variety tests are indicated by the following table:

The more notable yields secured in variety tests.

Crop and variety.	Number of varieties tested.	Period of test.	Average yield per acre.	Crop and variety.	Number of varieties tested.	Period of test.	Average yield per acre.
Barley (Mandscheuri)	8	5 yrs.	84.40 bu.	Flax (Manitoba)	4	6 yrs.	19.1 bu.
Barley (Imported No. 5,591 Iowa)	6	5 yrs.	69.08 bu.	Millet (Siberian)	7	7 yrs.	53.8 bu.
Barley (Purple)	6	5 yrs.	47.53 bu.	Emmer (Winter)	....	2 yrs.	2,494 lbs.
Oats (Daubeney)	37	5 yrs.	87.44 bu.	Sunflower (Mammoth Russian)	3	12 yrs.	74.7 bu.
Wheat (Dawson Golden Chaff)	14	15 yrs.	54.0 bu.	Corn (Early California Flint)	14	5 yrs.	66.7 bu.
Wheat (Minnesota No. 163)	13	7 yrs.	35.54 bu.	Sugar beets (Bruce Giant White Feeding)	11	6 yrs.	26.8 tons.
Wheat (Wild Goose)	6	5 yrs.	35.8 bu.	Swedes (Carter Invicta)	9	5 yrs.	22.52 tons.
Emmer (Common)	3	9 yrs.	3,023 lbs.	Carrot (Steele Improved Short White)	8	....	28.4 tons.
Spelt (Alstroum)	3	9 yrs.	2,268 lbs.	Corn (Eureka)	52	5 yrs.	25.52 tons.
Rye (Petkos)	3	6 yrs.	30.2 bu.	Sorghum (Orange)	9	12 yrs.	18.6 tons.
Buckwheat (Rye)	5	6 yrs.	33.0 bu.	Millet (Japanese Panicle)	9	5 yrs.	4.3 tons.
Field peas (Early Britain)	8	11 yrs.	37.7 bu.	Cabbage (Sutton Earliest Drumhead)	21	6 yrs.	27.3 tons.
Field peas (Potter)	27	3 yrs.	37.2 bu.				
Alfalfa (Texas Panhandle)	28	3 yrs.	4.6 tons.				
Alfalfa (Nebraska)	28	3 yrs.	4.3 tons.				
Field beans (Pearce Improved Tree)	8	12 yrs.	25.1 bu.				

Field experiments, C. D. WOODS (*Maine Sta. Bul. 188, pp. 25–32*).—In a test at the Highmoor Farm of 31 oat varieties, Silver Mine with a yield at the rate of 71 bu. per acre was excelled only by plats of Regenerated Swedish Select which yielded at the rate of 72.1 and 73.3 bu. per acre, respectively. The average yield of all varieties was at the rate of 64.2 bu. per acre and only one plat yielded at a rate less than 50 bu. Especial interest was attached to

4 samples of Banner oats secured from widely separated sources. Two plats planted with seed from the Canadian Northwest (Cooldale, Alberta, and Creelman, Saskatchewan) yielded about 5 bu. more per acre in each case than another plat planted with New Brunswick seed.

In a comparison of modified ridge culture and full ridge culture methods for potato growing in Aroostook County, the 3-year average yields secured were 273 and 283 bu. per acre, respectively. The author concludes that in the 3 years 1907–1909 there was "practically nothing to choose between the 2 methods so far as the yield was concerned in Aroostook County." The seasons of 1907 and 1909 were quite wet and that of 1908 was rather dry for high ridge culture.

Some soiling crops for Pennsylvania, T. I. Mairs (*Pennsylvania Sta. Bul. 109, pp. 3–20, figs. 6*).—The author presents a classification of soiling crops for the farmer's use as an aid in the selection of the crop best adapted to his conditions. A brief discussion is given of each of the crops thus classified and the results of experimental growings of many of them are stated.

The only vetch which gave promise of being useful in Pennsylvania was the hairy vetch. Orchard grass proved quite satisfactory as an early grass for soiling, but brome grass is not believed to be likely to take the place of the grasses already commonly grown. The following table states the highest and lowest yields and certain other data for the forage crops tested:

Range in yield of forage crops at the Pennsylvania Station.

Crop.	Years tested.	Sowed.	Harvested.	Amount eaten per cow daily.	Yield per acre.		
					Green forage.	Air-dry substance.	Crude protein.
				Lbs.	*Lbs.*	*Lbs.*	*Lbs.*
Canada peas and oats.	1902–1907	May 5, 1904	June 29–July 11	45	27,671	3,929	485
Do	...do	May 14, 1904	July 9–16	63	10,420	1,792	288
Cowpeas	1902–1906	June 27, 1904	Sept. 5–19	40	22,451	3,525	634
Do	...do	June 25, 1904	Sept. 22–25	50	11,117	2,590	474
Cowpeas and sorghum.	...do	June 28, 1905	Aug. 14–30	40	33,443	5,542	475
Do	...do	June 11, 1904	Aug. 29–Sept. 6	50	18,083	3,707	452
Soy beans	1902–1905	May 22, 1905	July 29–Aug. 7	40	15,604	3,238	427
Do	...do	May 12, 1902	July 2–Aug. 4	58	9,934	2,016	270
Hairy vetch	1898	Spring, 1898	July 15	....	18,094	4,267	....
Do	1899	.....do	June 16	....	1,250	....	....
Alfalfa	1903, 1905–7	Fall, 1904	June 17–23, 1907	82	20,205	4,126	658
Do	...do	Apr. 22, 1902	June 5–10, 1903	48	5,181	1,719	265
Barley and Canada peas.	1904	May 21, 1904	July 26–Aug. 2	50	19,415	3,436	550
Dwarf Essex rape	1902–1903	May 5, 1902	July 24–26	67	24,960	3,136	388
Do	...do	May 12, 1903	Oct. 12–13	48	10,340	1,442	365
Rye	1903–1907	Fall of 1904	May 9–30	39	21,974	4,569	468
Do	...do	Fall of 1902	Mar. 16–21	40	11,930	3,406	272
Orange sorghum	1902	May 13, 1902	Aug. 10–19	78	27,279	4,337	360
Winter wheat	1907	....	....	73	23,797	6,287	595

The harvest residues of cereals and field peas, R. Schulze (*Fühling's Landw. Ztg., 59 (1910), No. 23, pp. 801–807*).—Experiments made by the author showed that the air-dried weight of stubble and roots remaining after harvest amounted to 1,986 kg. per hectare (about 1,767.5 lbs. per acre) in the case of winter rye, 2,027 kg. per hectare from winter wheat, 2,110 kg. from oats, and 1,338 kg. from barley. The results secured for field peas were based on the calculation that 1 hectare would contain 300,000 plants, and under this assumption the quantity of air-dried residue after harvest would amount to 3,540 kg.

The weight of the kernel and its importance, H. QUANTE (*Fühling's Landw. Ztg., 60 (1911), No. 1, pp. 1–28*).—In this article the author discusses the absolute specific and volume weights of kernels of the common grains in their relation to each other and with reference to their value in determining the quality of the grain. It is pointed out that the absolute weight or the weight per thousand kernels is of the greatest importance, as it points out directly the development of the embryo and the quantity of reserve material contained in the kernel.

Methods of conducting variety tests, H. SCHOLZ (*Fuhling's Landw. Ztg., 59 (1910), Nos. 22, pp. 776–785; 23, pp. 807–830*).—The author discusses at some length the faultiness of ordinary methods of conducting variety tests and proposes means by which the possibility of error may be eliminated or much reduced.

Test of local and improved varieties of barley, G. PAMMER and E. FREUDL (*Wiener Landw. Ztg., 61 (1911), No. 2, pp. 10, 11*).—The results of variety tests carried on for 3 years are reported and discussed. It was found that while the local varieties gave good results, the improved varieties gave better results, and among these Loosdorf Thaya, Zaya, and Laa are mentioned as being especially promising.

Barley culture in Wisconsin, R. A. MOORE and A. L. STONE (*Wisconsin Sta. Bul. 212, pp. 3–17, figs. 7*).—Discussions of the status and of classes of barley in Wisconsin and in the United States are followed by directions for barley breeding, growing, and marketing, and the prevention of smut.

Five years' tests reported by 1,020 members of the Wisconsin experiment association show that Oderbrucker barley gave a 5-year average in different parts of the State of 35.7 bu. per acre, or 4.9 bu. above that of the other varieties tested. At the experiment station the 10-year average for this variety was 50.7 bu., as compared with 28.7 bu. of the common barley secured by Wisconsin farmers, and 25.8 bu. for the United States as a whole.

The management of clover in corn belt rotations, J. A DRAKE (*Ohio Sta. Circ. 111, pp. 3–19, figs. 4*).—This circular, prepared in cooperation with the Office of Farm Management of this Department, is based largely on conditions in the corn belt area of Ohio. A general discussion of the value of clover in rotations is followed by suggestions on rotations including various grain crops, including a description of benefits which have been noted from a light mulch for clover of straw or cornstalks.

Bird's foot clover or yellow trefoil (Lotus corniculatus) and its value as a pasture grass, H. WITTE (*Sveriges Utsadesfor. Tidskr., 21 (1911), No. 2, pp. 106–110*).—The author reports and discusses the results of trials of grass seed mixtures containing bird's foot clover. This clover appeared, in Denmark, to demand less lime in the soil than red clover and to be less sensitive to drought, outyielding red clover in dry seasons. It also outyields red clover on poor soils but should not be grown in cold or acid soils.

Increased yields of corn from hybrid seed, G. N. COLLINS (*U. S. Dept. Agr. Yearbook 1910, pp. 319–328*).—Similar discussions and data from the same author have already been noted (E. S. R., 24, p. 236). In work with first generation hybrids in sweet corn it was observed that "in 8 of the 10 hybrids the yield per plant exceeded the average of the parents, and in 6 instances it exceeded that of either parent. The average yield of all the hybrids compared with the average of the pure strain showed an increase of 57 per cent."

Corn growing in Washington, G. SEVERANCE (*Washington Sta. Popular Bul. 38, pp. 8, fig. 1*).—The author suggests methods of soil preparation, and of planting, seed selection, harvesting, and ensiling corn in Washington.

Of varieties and strains tested at Pullman the Flint variety Gehu, North Dakota White Flint, Rhode Island White Flint, and a Yellow Flint secured from Leland, Idaho, and the Dent varieties, Yellow Dent secured from Oakesdale, Wash., Yellow Dent from Pullman, Wash., Northwestern Dent, North Dakota Golden Dent, Dent secured from Myers Falls, Yellow Dent secured from Pullman, Wash., Minnesota King, and White Dent secured from Pullman, matured in about the order named. Minnesota No. 13, Bloody Butcher, and White Cap Yellow Dent did not mature at the station, but are regarded as promising varieties for the warmer and longer seasons of Walla Walla and similar localities.

Thayer Dent and Windus Dent were selected for improvement and distribution. They are briefly discussed as are also Minnesota King and certain other varieties tested. Cooperative trials of the Thayer and Windus varieties in 1910 indicate that a majority of the farmers reporting results from that part of the wheat region where the rainfall exceeds 15 in. were successful with these varieties, but that in the very dry belt a majority reported failures.

Some possibilities of the cowpea in Macon County, Alabama, G. W. Carver (*Alabama Tuskegee Sta. Bul. 19, pp. 5–23, figs. 5*).—Directions for the production and harvesting of cowpeas and a discussion of their value as food for man and animals are followed by directions for preparing numerous dishes from the cowpea previously noted (E. S. R., 20, p. 169), and notes as to diseases and insect pests.

Groundnuts in the Bombay Deccan, G. H. Kelkar (*Dept. Agr. Bombay Bul. 41, 1911, pp. 17*).—Tables report the area devoted to peanut growing in the Bombay Presidency, the average rainfall of the places where this crop is grown, and the exports, covering the past 14 years in each case. The author assigns as causes for the decline in acreage (1) the tikka disease due to *Septoglœum arachidis*, (2) unfavorable seasons, (3) the degeneration of seed due to improper cultural methods, (4) lack of proper rotation, and (5) failure to replenish the soil by the addition of manure.

An itemized statement of the cost of production and the returns per acre of peanuts indicates a profit of 37½ per cent. In tests, fungicides gave negative results so far as the tikka disease was concerned. Newly imported varieties were attacked by the disease, but some promised to escape serious damage because of their early ripening period.

In a test of 5 varieties, Big Japanese and Selected Virginia produced the highest yields of 3,171 and 2,966 lbs. per acre, respectively. A table states the oil content, number of kernels per pod, and percentage of kernels to nuts of the original seed and the farm-grown crop of each of the 5 varieties.

In a rate of planting test the larger varieties were planted 12 in. apart each way and 12 by 9 in., while the smaller Spanish and Japanese varieties were planted 9 by 6 and 6 by 4 in. apart. Closer plantings produced the higher yields in case of every variety except Tata. The Spanish and small Japanese varieties stood highest in oil percentage and percentage of kernels. A table states the weight per acre of (1) roots, stems, and leaves; (2) shells of seeds; (3) kernels produced by each of the 6 varieties as well as the amount of nitrogen, phosphoric acid, and potash per acre produced by each of these 3 divisions of the plant, and the amount of oil per acre produced by the kernels.

Variety tests of oats, F. D. Gardner and J. A. Runk (*Pennsylvania Sta. Bul. 108, pp. 3–14*).—Yields in 1906, 1907, and 1908, previously noted (E. S. R., 23, p. 536), are reported, and also yields in 1909 and 1910.

In 1909 Japan oats yielded 63.4 bu. on its best plat as compared with corrected yields of 63.6 and 63 bu. respectively from Kherson and Joanette. In 1910 the highest corrected yield of grain was secured from the variety 453–06.

In a test of 8 varieties which averaged 13.6 per cent of smutted heads New Danish White appeared most resistant, with only 8 per cent smutted. Tables indicate the average yields secured from varieties that have been under test for periods of from 2 to 20 years, and give descriptions of 24 varieties.

Three years' cooperative tests of winter oats have resulted in failures in every county included in the test except for one report each from the counties of York and Chester. The author concludes "that winter oats are not adapted to Pennsylvania conditions, although in mild winters they may succeed in the southeastern portion of the State."

Field peas on a Palouse wheat farm, G. SEVERANCE (*Washington Sta. Popular Bul. 36, pp. 4, fig. 1*).—A general discussion of field peas under Washington conditions and directions for growing and harvesting the crop accompany a statement of the results of cooperative trials of seed distributed from demonstration trains.

Peas have been grown on the station farm every year since its establishment. The yields for which records have been kept range from 3.3 tons of cured hay per acre from Marrowfat peas and 4.2 tons from Canada field peas, and the grain yields from 9.3 bu. per acre of Canada field peas in 1909 to 38.5 bu. in 1903 of the same variety. The yield of 4.2 tons of hay per acre was secured on a rich north slope.

Productiveness and degeneracy of the Irish potato, C. L. FITCH (*Colorado Sta. Bul. 176, pp. 16, figs. 8*).—The author submits in this bulletin preliminary studies mostly within the Pearl variety, but he believes "that the principles true of one variety will be fundamental to all varieties of Irish potatoes." He indicates that certain plant and tuber characteristics are correlated and that the tuber and its parts are analogous to the stem and its parts, as shown by drawings of a tuber, an aerial tuber, and a plant stem. Early dryness, close and deep cultivation, and disease are indicated factors of the tendency toward seed bearing. "Tuber productiveness in Pearls is inversely proportionate to the sexual development of the plant."

The author describes 5 types or stages of Pearl vine degeneracy and states the tendency of each to appear under various local conditions. The same lot of seed from Del Norte produced only the better types when planted at Carbondale in 1910, but produced also the poorer types the same year at Greeley. Four year's hill selection at Greeley indicated that sexual tendencies are stronger than selection, as long, cylindrical and irregular shaped tubers and tendency to seed-bearing appeared in spite of selection to prevent these phenomena. Change from region to region or from farm to farm, if not to a richer soil, retards this development, thus maintaining to a degree the good tuber shape. "We find, however, that constant change may hold in suspension for several years the tendency to seed bearing and tuber degeneracy, which may then come suddenly on return to less favorable conditions, or on being grown for a second year on the same ground."

The author judges that incomplete fertilization is characteristic of the hybrid in Colorado of Rural pollen and of the pollen from the Early Rose family as 650 seed balls of this hybrid contained no seeds. Of 7 seed balls saved from crosses of Pearl and Rural at Del Norte 1 of Rural pollen on Pearl contained no seeds, while the 6 of Pearl pollen on Rural all contained abundant seeds.

The author defines the term "balance" "as the proper relative growth of the main stem, branches, and leaves and the proper relative influence indicated by aerial tubers to be exercised by each upon the shape of tubers formed by the swelling of underground stems."

Ten rules for the production and selection of "good Pearl seed potatoes" are given.

The potato and its culture, J. H. SHEPPERD and O. O. CHURCHILL (*North Dakota Sta. Bul. 90, pp. 83–126, figs. 12*).—This bulletin gives directions for the production, harvesting, storing, and marketing of the potato crop, with notes on the controlling of diseases and insect enemies, a potato score card, and a plan of a potato cellar. Many of the suggestions are based upon the results of experimental work.

The use of a rotation consisting of a crop of potatoes followed by 3 crops of wheat resulted in an average annual increase of 3.3 bu. in the yield of wheat during the 12 years of the test. The grain crop secured, even in the least favorable seasons, equaled those following the best summer fallow. In 1900, wheat following potatoes yielded 24.3 bu. per acre as compared with 29 bu. after summer fallow, and 4.7 bu. after grain.

Large and small potatoes planted whole gave yields of 138.7 and 92.4 bu. per acre respectively as compared with 100.9 bu. per acre secured from plantings of pieces containing 2 eyes each. These are the averages of 3-year tests at each of the 3 substations. Twenty bu. more seed per acre was required with large uncut tubers than with the pieces containing 2 eyes each.

The potato industry of Colorado, C. L. FITCH and E. R. BENNETT (*Colorado Sta. Bul. 175, pp. 3–80, pl. 1, figs. 44*).—This bulletin describes at some length the potato industry of Colorado and gives advice on different points to potato growers in that State, including data on soils, cultural methods, storage, including plans for potato cellars, potato standards as to quality, and on potato diseases. An article by S. A. Johnson (pp. 42–45), on Potato Insects, is also included.

Observations were made on the actual loss which resulted from poor stands and it is reported that hills on either side of a place where but 1 hill is missing make up one-half the loss as a result of their better development, and that where more than 1 hill is missing there are positive losses of yield except for the weight of one-half of 1 hill. Observations on the stand of the potato crop in relation to the yield and the quality of the crop were also made in different parts of the State, and the results are reported in tabular form with comments.

Study on the culture of the sugar beet in different countries, H. PELLET (*Ann. Sci. Agron., 3. ser., 5 (1910), I, Nos. 1, pp. 1–52; 2, pp. 81–141; 3, pp. 161–180, dgms. 10*).—The author reviews the industry of beet-sugar culture in different European countries at some length and shows, among other facts, that Germany and Bohemia have an average production of 30,000 kg. per hectare (about 13.35 tons per acre), and that the sugar content of the beet in Germany rose from 11 to 12 per cent for the years 1885–1890 to from 15 to 17.6 per cent for the years 1905–1908, inclusive. In Bohemia, the sugar content of the beet was gradually increased from 13.1 per cent in 1899 to 17.7 per cent in 1908. The average yield of sugar for the European sugar-beet growing countries has ranged for several years from 5,050 to 5,155 kg. per hectare. An increase in yield and in sugar content was also secured in Moravia, Silesia, Hungary, Sweden, Denmark, and Belgium, while in France the development along these lines was the least pronounced.

The formation of the sugars and starch in the sweet potato, T. E. KEITT (*South Carolina Sta. Bul. 156, pp. 3–14*).—Continuing previous work (E. S. R., 20, p. 181), this bulletin reports the results of analytical work upon sweet potatoes grown on clay soil in 1908 and sandy soil in 1909.

In 1908 the sugary varieties chosen were Purple Yam and Fulleton Yam, and the starchy varieties Nancy Hall and Polo. Samples were taken at 5 dates ranging from August 28 to November 18. It is noted that wet cloudy weather prevailed during the 10 days preceding the taking of the first samples. In every case the first samples show higher starch percentages than the second samples while the latter had higher moisture contents, except in the case of the Fulleton Yam. Recalculation of the increased moisture to the moisture of the earlier samples would not account for the decreased starch content, which was in fact almost as great as the increase in water content. The author suggests 2 reasons for this condition: (1) That at this period of rapid growth some starch and sugar might be used in making cellulose of cell coverings, and (2) that as cells rapidly increase their size their water content also becomes greater. He also observes that the indications are that moisture content varies with the stage of growth irrespective of rainfall, and that the upward tendency of starch and low sugars continued until maturity or until freezing killed the vines. On August 28 sucrose was high and glucose low, but as maturity approached sucrose decreased and glucose increased, although both starch and total sugars decreased during the most rapid development. Later the starch increased, but water and total sugars decreased. On November 18, however, the sucrose was again high and glucose low.

In 1909 the work was continued with Purple Yam and Pumpkin Early Yellow Yam as sugary varieties and Polo and Brazilian as the starchy varieties.

As a general conclusion from the 2 years' work the author believes that in the immature potato sugar may be present either as glucose or sucrose, depending upon meteorological conditions, and that sucrose is formed as a product of the breaking down of starch as the potatoes mature. The 1909 crop grown on sandy soil was much higher in starch than the 1908 crop grown on clay loam. Where starch production is the object, if the plant is not evidently mature, it should be dug immediately after the first killing frost, as the highest starch percentage since the tubers have developed is then present.

Experiments in crossing turnips, J. H. Wilson (*Trans. Highland and Agr. Soc. Scot., 5. ser., 23 (1911), pp. 18–31, figs. 8*).—In a cross between the purple-top Swede (seed parent) and a yellow turnip, it was observed that there was a smaller number of seeds in the capsules than in those resulting from the fertilization of the Swede by its own pollen. The seeds "were distinctly smaller, being virtually like average turnip seed."

When the hybrid seedlings developed, new characters in leaves and bulbs evidenced the success of the experiment. Twelve bulbs resembled closely the yellow turnip while 6 were purple-top. The neck was very short if present at all. The author attaches much significance to the presence "of irregular swellings on the roots and at the bases of the bulbs of certain of the plants, these swellings bearing a considerable outward resemblance to finger-and-toe disease."

The flowers of the hybrids were intermediate in character and a very large proportion of the pollen grains were misshapen and abnormally small. The capsules were undersized and apparently absorbed only a small part of the resources of the plant, which used its reserve energy "in the development of a successive series of fine twigs, the latest of which were quite green and bearing flowers when the earliest capsules were ripe and the shoots that bore them were dead and dried."

Irregularity in fruiting and serious deterioration in the form of the bulbs was observed in the second generation. The more closely the hybrid resembled the turnip the more liable it was to malformation by the counterfeit finger-and-toe disease. The author describes the second generation plants in detail and expresses the opinion that there is "little likelihood of such a strain as was perpetuated in the experiments just described leading to useful commercial results."

He also reports the results of crosses with curled kale in which it was observed that the Swede-like crosses were the least diseased. The reciprocal crosses of turnips and Swedes in which the seed parent was the same as that used in the pollen parent in the series just discussed were traced for several generations, but "they varied in a fashion not to be distinguished from those of the crosses described in the foregoing pages."

Weeds in relation to soils, W. E. Brenchley (*Jour. Bd. Agr.* [*London*], *18* (*1911*), *No. 1, pp. 18–24*).—These pages report the results of observations on about 150 fields yielding 107 species of weeds of 74 different genera.

Thirty species representing 28 genera were each seen but once. A table states the frequency with which each of 36 of the weeds was observed on (1) clay and heavy soil, (2) chalk, and (3) sand and light loam. "While the nature of the soil plays such an important part in determining the local weed flora, the character of the crop, generally speaking, is a matter of indifference. The one exception to this rule is in the case of seed crops—clover, lucern, sainfoin, and trefoil."

In view of the fact that 6 species were found to be popularly designated as "twitch" or "couch" grass in different localities, the author suggests that it is advisable to apply the name "couch" to *Triticum repens*, only "designating as 'twitch' all other grass weeds of the characteristic habit of growth."

Special investigations indicate that colts-foot and horsetail, which are often found together, occurred indiscriminately on acid or alkaline soils, but could not be regarded as indicative or symptomatic, while spurrey (*Spergula arvensis*) "is very symptomatic of acid soils, and it often disappears entirely where lime is applied, reducing the acidity."

HORTICULTURE.

A new method of forcing plants, S. T. Parkinson (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 245–257, pls. 3*).—The various methods which have been experimented with in forcing plants are briefly noted, and demonstration experiments conducted at the Southeastern Agricultural College, Wye, Kent, to test the use of the warm bath method of forcing plants employed by Molisch (E. S. R., 23, p. 40) are described. The method was used with more or less success, but the results as a whole indicate the importance of knowing the best time for treatment in the case of any particular variety of plant.

In the experiments with rhubarb, in addition to the forcing stimulus noted, the treated plants gave a much larger yield. The latent effect of the bath was also illustrated, since the treated plants were not potted for 4 or 5 days after dipping.

Report of the professor of pomology, J. W. Crow (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36* (*1910*), *pp. 142–148*).—Notes are given on the management of the college orchards, and a table showing the yields of white, red, and black currants tested for the 5 years, 1904 to 1908, inclusive.

In tests reported of spacing strawberry runners by hand instead of allowing them to find their places naturally, the yield from the hand-layered runners was about double that from the naturally-layered runners. The marked difference is attributed to the dryness of the season whereby crowded plants would suffer much more than those not crowded.

A trial of the overhead irrigating system with lettuce gave highly satisfactory results and indicates that in times of drought an artificial system of irrigation can be profitably used by the market grower.

As a result of tests conducted for a number of years, lists are given of varieties of fruits and vegetables recommended for culture, together with the results secured with indoor tomatoes during the past season.

Garden notes, 1910, E. R. Bennett (*Colorado Sta. Bul. 172, pp. 3–16, figs. 3*).—During the season of 1910 a number of annual truck crops adapted to Colorado conditions were grown in the station gardens. Notes are herein given relative to the behavior of the different vegetables grown and their adaptability to Colorado conditions.

Considerable trouble has been experienced in the reversion of selected cabbage seed to original types. From breeding experiments conducted by the station in 1908–9 the possibility of procuring certain plants with fixed characteristics, in accordance with Mendel's law, was indicated.

Production of a white bean lacking the factor for total pigmentation—a prophecy fulfilled, R. A. Emerson (*Amer. Breeders' Assoc.* [*Proc.*], *6* (*1909*), *pp. 396, 397*).—In continuation of his studies relative to the inheritance of color in the seeds of the common bean (*Phaseolus vulgaris*) (E. S. R., 22, p. 40), the author has been successful in producing a white bean without the total pigmentation factor. The results are briefly discussed.

Cultural experiments with cabbage in 1910, Huber et al. (*Mitt. Deut. Landw. Gesell., 26* (*1911*), *Nos. 24, pp. 314–317; 25, pp. 349–353*).—Tabular results are given of cooperative variety and cultural tests of cabbage conducted under the direction of the German Agricultural Society in 1910.

The manurial constituents taken from the soil by an average crop of cauliflower, R. Harcourt (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36* (*1910*), *pp. 102, 103*).—The analytic results and conclusions are given of a study of the above subject made by J. F. Harries.

Figuring on a yield of 5 tons of heads per acre, the total fertilizing ingredients in the heads, leaves, and roots were phosphoric acid 36.5 lbs. potash 88.3 lbs., nitrogen 116.5 lbs., and lime 94.3 lbs. The heads, which are generally the only part removed from the soil, contained phosphoric acid 10.2 lbs., potash 24.5 lbs., nitrogen 33.9 lbs., and lime 6.7 lbs. These figures as compared with figures for various crops given by Hopkins (E. S. R., 23, p. 17) indicate that cauliflower is a relatively light feeder.

The cultivation, production, preparation, and utilization of castor seed (*Bul. Imp. Inst.* [*So. Kensington*], *9* (*1911*), *No. 1, pp. 17–35*).—A general account including information relative to experimental plantings made in British territory.

Experiments on the storage of onions (*Agr. News* [*Barbados*], *10* (*1911*), *No. 238, p. 191*).—The results are given of certain experiments on the storage of onions, conducted during 1910 at the Antigua Experiment Station with a view of finding some means of carrying the local crop over periods of the year when onions are not in season, and for the purpose of furnishing large bulbs for planting the local crop, it being necessary at present to raise the crop from sets. Twelve onions were used in each test. One lot was dusted with slaked lime, another with flowers of sulphur, and others were treated with carbon dioxid gas, Bordeaux mixture, 1:1,000 corrosive sublimate solution, and sulphur dioxid gas, respectively. The onions were stored in a well-ventilated room and examined at different intervals from April to October, inclusive. None of these methods of treatment materially affected the rate of decay of the bulbs, although the flowers of sulphur seemed to have some slight beneficial action.

No advantage was gained by stringing the onions together.

Observations on the blossoming of our hardy cultivated fruits, C. H. Hooper (*Jour. Roy. Hort. Soc.* [*London*], *36* (*1911*), *No. 3, pp. 548–564, pls. 3*).—Comparative data, collected at Wye, Kent, are given showing the average date of commencement, full bloom, and duration of bloom of a large number of varieties of plums, pears, and apples. Similar data are given for cherries as well as for various small fruits.

Selecting an orchard site, N. O. Booth (*Oklahoma Sta. Circ. Inform. 13, pp. 4, fig. 1*).—A brief popular discussion.

Notes on a dry-land orchard, J. E. Payne (*Colorado Sta. Bul. 173, pp. 3–7, figs. 6*).—A small orchard consisting of cherry, plum, and apple trees, together with gooseberry plants, was established at the Plains Substation at Cheyenne Wells, in 1894. Forest trees were planted for windbreaks around the orchard and along the north side of the farm. Brief notes are given on the history, behavior, and condition of the trees in this orchard when inspected during the past year.

Although this is one of the best dry-land orchards in eastern Colorado, its history as a whole shows that the apple trees in particular have needed extra water at some time during each year since they began bearing fruit. The cherry and plum trees produced good crops without extra water nearly every season, but would also have been benefited by additional water. The gooseberries bore well until neglected.

It is pointed out that nearly all settlers plant more trees than they find time to care for and consequently lose all. The dry-land orchard is not considered a commercial proposition, but the planting of a few well-selected trees which may be given extra care is recommended. Where trees are used for windbreaks, the history of the orchard has shown that they should be planted at least 100 ft. from the fruit trees.

An examination of the roots of 4 apple trees dug up in August, 1910, showed that nearly all the large roots were in the first 12 in. of soil. The roots of these trees grew deeper when the soil was wet below the normal depth. The growth of nursery-grown trees which were planted from 2 to 2½ ft. deeper than in the nursery was not decreased nor was the position of the feeding roots materially altered.

Thinning the Winesap.—Winter and frost injuries of fruit trees, R. S. Herrick (*Colorado Sta. Bul. 170, pp. 19, figs. 3*).—The first section of this bulletin reports an experiment in thinning Winesap apples conducted in 1910, discusses the advantages of thinning, and gives directions for it. The remainder of the text comprises a discussion of the nature of winter injuries of young and old trees and of spring frost injuries, together with suggestions for the prevention of frost injuries in general.

The fruit of 6 Winesap trees was thinned about June 16, or shortly after the June drop, 2 other trees were thinned on July 22, and 2 unthinned trees were used as checks. The average results showed a gain of $1.85 per tree for the thinned fruit. The thinned trees yielded an average of 12.72 boxes, of which 5.34 were extra fancy, 3.07 extra choice, 3.2 standard, and only 1.11 total culls, as compared with an average of 17.58 boxes on the unthinned trees, of which only 2.5 were extra fancy, 1 extra choice, and 9 standard, with 5.08 boxes of culls. In this experiment late thinning was just as advantageous in improving the quality and increasing the quantity of high grades as early thinning. Early thinning is recommended, however, in order that the remaining fruit may develop quicker and the vitality of the tree be conserved.

Protecting trees from rabbits, D. C. Mooring (*Oklahoma Sta. Circ. Inform. 14, pp. 3, fig. 1*).—A popular circular describing the protection of trees from rabbits by means of trapping, poisoning, tree protectors, and washes.

Orchard spraying problems and experiments: A review of and a contribution to previous data, W. W. Bonns (*Maine Sta. Bul. 189, pp. 33–80, pls. 12, figs. 10*).—This bulletin contains a review of the literature of orchard spray injury and of the substitution of lime-sulphur for Bordeaux in combating fungus diseases, together with a report of a comparative test of various lime-sulphur solutions and Bordeaux conducted by the station at the Highmoor farm in 1910. Lead arsenate was used with each mixture and studied both as to its insecticidal value and as to its relation to possible leaf and fruit injury when used with lime-sulphur.

The spraying was done in a Ben Davis apple orchard, this variety being especially susceptible to spray injury. Weather conditions during and following the period of the second application were conducive to spray injury. More or less injury was found on all of the plats, and the unsprayed fruit also suffered severe russeting and malformation. The foliage injury on the lime-sulphur plats was of little consequence, but was about 25 per cent more severe on the Bordeaux plats. Fruit injury was from 2 to 5 times greater on the Bordeaux plats.

Fruit sprayed with lime-sulphur showed two kinds of injury, one form of which was similar to but less severe than Bordeaux injury. The other form, which is attributed to the arsenical used with the sulphur spray, occurred without exception at the calyx end and is designated as calyx injury. This injury was first observed when the fruit was about one-third full size as a fairly regular and circular dark brown discoloration surrounding the sepals and about 1 cm. in diameter. As the season advanced it became blacker but did not spread. In rare cases the injury extended well into the basin, was irregular in outline and confined to one side of the calyx. It was invariably accompanied by a bright carmine aureole upon the edge of the basin, the aureole disappearing with the growth of the fruit. The injured skin frequently showed a tendency to separate and curl away slightly from the normal skin adjacent.

The results of one season's work confirm the consensus of results elsewhere secured as to the fungicidal value of the lime-sulphur mixtures. With weather conditions favorable to spray injury lime-sulphur did less damage than Bordeaux, both qualitatively and quantitatively. Arsenate of lead proved equally effective with lime-sulphur and with Bordeaux but was decidedly injurious when used with Sulfocide. A neutral lead arsenate is recommended in order to reduce the tendency to arsenical injury.

Both homemade and commercial lime-sulphur mixtures as substitutes for Bordeaux are recommended for trial by Maine fruit growers, and directions are given for preparing the mixtures.

Spraying experiments, C. J. S. Bethune (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), p. 31*).—A summary is given of the general results secured in tests of homemade and commercial lime-sulphur wash in concentrated form and used in conjunction with arsenicals. The results are based upon tests made in the college and elsewhere in the Province.

Concentrated lime-sulphur, whether homemade or commercial, was found to give excellent results as a spring wash just before the buds burst. It controls blister mite, San José scale, and oyster-shell scale satisfactorily, is just as good a fungicide as Bordeaux in the spring, and when properly diluted for a summer spray will control apple and pear scab apparently as well as Bordeaux. It sticks to the foliage and fruit about as well as Bordeaux and when diluted about 1:35 is as cheap. Combined arsenate of lead and lime-sulphur gives as satisfactory results as the 2 sprays used separately and there is apparently less danger of injury to the foliage than from the lime-sulphur alone. Either arsenite of lime or Paris green combined with lime-sulphur is apt to cause serious injury to the foliage and sometimes to the fruit, especially when spraying for the codling moth and in later sprayings.

Lime-sulphur, its use as a fungicide and an insecticide, P. J. O'Gara (*Medford, Oreg., 1911, pp. 31*).—A popular pamphlet dealing with the history and use of lime-sulphur solution, and prepared especially for the fruit growers of Rogue River Valley.

Spray calendar, A. L. Lovett (*Oklahoma Sta. Bul. 92, pp. 3-16*).—This bulletin contains popular information relative to spraying machinery, spray solutions, dust sprays, and other insecticides, together with a spray calendar covering most of the common troubles of fruits, shade trees, and vegetables.

Spraying calendar for 1911, R. K. Beattie and A. L. Melander (*Washington Sta. Popular Bul. 33, folio*).—The calendar includes directions for the control of the more important diseases and insects attacking fruits and vegetables, together with directions for preparing sprays.

Promising new fruits, W. A. Taylor (*U. S. Dept. Agr. Yearbook 1910, pp. 425-436, pls. 8*).—In continuation of similar articles (E. S. R., 23, p. 143), historical notes with descriptions and colored plates are given of the following new and little-known fruits that are considered worthy of more extensive trial: Lowry and Kinnard apples, Payne peach, Hoosier raspberry, Dugat orange, Family avocado, Cecil mango, and the Tamopan persimmon.

Commercial apple orcharding in Ohio, H. A. Gossard (*Ohio Sta. Circ. 112, pp. 3-15, figs. 13*).—In order to determine whether the results secured in previous spraying tests (E. S. R., 21, p. 352) might be considered as representative or as exceptional, and also to determine what combinations of sprays were best suited to Ohio conditions, cooperative spraying demonstrations were conducted by the station in 1909 in several different localities of the State. The quantitative records secured with some of these orchards are given, together with recommendations as to spraying procedure supplemental to those issued in previous publications of the station (E. S. R., 25, p. 39).

The Colorado raspberry industry, R. S. Herrick and E. R. Bennett (*Colorado Sta. Bul. 171, pp. 3-16, figs. 4*).—This bulletin deals with raspberry culture with special reference to Colorado conditions. It discusses the soil, climatic, and moisture requirements of raspberries, the preparation of the plantation, varieties, propagation, planting, cultivation and irrigation, winter protection, pruning, general management, yields, harvesting, possibilities of the industry, and diseases.

The mango in Florida, P. H. Rolfs (*Proc. Amer. Pomol. Soc., 1911, pp. 34-49*).—A brief statement of the progress made in mango culture in Florida, including descriptions of the different types of mangoes now grown there.

The precooling of fruit, A. V. Stubenrauch and S. J. Dennis (*U. S. Dept. Agr. Yearbook 1910, pp. 437-448, pls. 5*).—The purpose of this paper is to present in a conservative and concise form the progress and results of the investigations which have been made by the Bureau of Plant Industry and to give the exact status of the process as far as it has been applied under commercial conditions. See also a previous note (E. S. R., 24, p. 641).

Cooperation among fruit growers, W. H. Chandler (*Missouri Sta. Bul. 97, pp. 3-58, figs. 6*).—This bulletin discusses and illustrates the growth of cooperation among fruit growers of the United States and Canada during the past few years and gives a list of 54 organizations, together with the constitution and by-laws of several. Some of these handle more than $1,000,000 worth of fruit in a year and some nearly $50,000,000 worth.

In the experience of 54 associations reporting, the principal benefits derived from cooperation are found to be as follows: "(1) Enabling the small growers to ship in car lots; (2) distributing the crop so as to prevent gluts in the markets; (3) enabling the growers to establish a brand that will be known and sought in the markets, thus insuring better prices; (4) making possible better business methods in dealing with the fruit buyers, transportation companies, etc.; (5) enabling a community to make use of varieties of fruit that for any reason might not be desirable except in small quantities; (6) better equipment for handling the crop for a section; (7) insuring better care of the orchards; and (8) giving greater general business stability."

Cooperation in the handling and marketing of fruit, G. H. POWELL (*U. S. Dept. Agr. Yearbook 1910, pp. 391–406*).—The author shows the wide development of the cooperative fruit marketing idea in this country, points out the fundamental principles of cooperation, and discusses the organization and management of cooperative associations. A short account is also given of the organization of the citrus-fruit industry of California.

The existing duties on fruit as compared with the future new tariff agreement (*Deut. Obstbau Ztg., 1911, No. 12–13, pp. 205–220*).—This consists of a review of the existing tariff on various classes of fruit shipped into Germany from European and other countries, and an examination of proposed tariff agreements, with special reference to their influence on the development of native fruit industries in Germany. The statistics also include the German imports and exports of fruit for the years 1900 to 1909, inclusive, both by varieties of fruit and by exporting countries.

Notes on soil and plant sanitation on cacao and rubber estates, H. H. SMITH (*London, 1911, pp. LII+632, figs. 108*).—This work comprises as a whole a résumé of information gleaned by the author from numerous practical planters, men of science, directors of agriculture, and others actually engaged in planting up and developing the Tropics, relative to the treatment of the soil, plant diseases, and pests. A number of tropical authorities have directly contributed to the book.

The successive chapters in part 1 discuss estate sanitation and hygiene, protective belts, stump pulling, manuring cacao, hygiene in cacao planting, the importance of nitrogen as a plant food, manuring cacao in Cuba, the manurial requirements of rubber trees, green manuring, preparation of plant foods from waste products, inoculation as a cure for pests and disease, the treatment of tropical plants, fungi pests, general pests, cacao diseases and pests, cacao beetle, and grafting cacao. Part 2 deals principally with rubber and discusses rubber on the Gold Coast, tapping rubber, rubber diseases, the culture and management of Castilla and Ceara rubber, wild versus cultivated rubber, plowing, soil sanitation by means of disk plows, the destruction of pests, cork insulation for estate buildings, rat extermination, rubber machinery, vacuum drying for rubber, cacao, copra, etc., the drying of cacao, and tapping knives and estate supplies.

Camphor cultivation in the United States, S. C. HOOD and R. H. TRUE (*U. S. Dept. Agr. Yearbook 1910, pp. 449–460, pls. 3*).—General consideration is given to the camphor industry as a whole, present methods of manufacture, and the cultivation of camphor in the United States as an ornamental. With the results of cultural experiments being conducted in Florida by the Bureau of Plant Industry as a basis, suggestions are given for the commercial cultivation of camphor trees in the form of hedges, including methods of harvesting and distillation.

Thus far the camphor industry in the United States is in an experimental stage, and no definite information has been secured relative to the yields and profits to be expected. At the present time it is not considered advisable to plant camphor in small areas with the hope of securing profitable earnings by selling the trimmings to a near-by distilling plant.

Report of the professor of landscape gardening, H. L. HUTT (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 149–155*).—An outline of the work for the year, together with lists of the more desirable ornamental shrubs, hardy roses, gladioli, geraniums, and annuals based on tests conducted on the college grounds.

Trees and gardens.—Hints on the cultivation of trees, flowers, and vegetables, and on the general improvement of school grounds (*Ed. Dept. Victoria Circ. Inform. 16, 1911, pp. 24, figs. 16*).—This circular comprises a number of articles, chiefly by Victorian writers, containing information on the above subjects.

Permanent lawns for the South, C. C. Newman (*South Carolina Sta. Bul. 157, pp. 3–14, figs. 6*).—Experiments were begun at the station in 1899 to determine what grasses were best suited for permanent lawns in the South. Out of 35 varieties of grasses and clovers sown on plats 20 by 30 ft., only Kentucky blue grass, Bermuda grass, herd's grass, and white clover were retained after the third year as being suitable for permanent lawns. Kentucky blue grass, Bermuda grass, and white clover were again tested on different types of soil and exposure. The results of these subsequent tests which extended over a period of 9 years are here given.

Previous to establishing the plats the land was sown in peas in May, the vines being cut for hay in September and the pea stubble turned under. Six tons of thoroughly composted manure and 300 lbs. of lime were applied per acre before the land was plowed. Six hundred lbs. of a fertilizer analyzing 8 per cent phosphoric acid, 4 per cent nitrogen, and 5 per cent potash were subsequently incorporated with the soil by harrowing. The seed was sown the first week in October. Nitrate of soda at the rate of 75 lbs. per acre was applied to each plat each year about the middle of March. The results show that Kentucky blue grass when used alone thrives best on a clay or a clay-loam soil, yet when sown on sandy-loam soil with good clay subsoil and with a northern exposure it does well, provided the seeds are sown in the early fall. The plants from spring-sown seed do not become well established before the hot, dry weather, and frequently much of the grass is dead by fall.

Kentucky blue grass and Bermuda grass make a good lawn when grown together. The Bermuda grass predominates in the light soils and warm exposures and the blue grass on northern exposures. On red clay with clay subsoil with an open exposure both grasses have been growing together for 9 years, neither one being able to crowd out the other. In all cases this mixture has crowded out crab grass after the second summer. Mixtures of Kentucky blue grass and white clover and of Kentucky blue grass, white clover, and Bermuda grass grown with an open exposure on red clay with clay subsoil have also made good lawns. The addition of the white clover seems to be beneficial both to the blue grass and the Bermuda grass. The results as a whole indicate that a mixture of Kentucky blue grass and Bermuda grass is well adapted to partially shaded lawns.

When neither blue grass nor white clover can be grown successfully, Bermuda grass is recommended as one of the very best grasses for a lawn. For large lawns around country homes or in large groves where a coarse grass is not objectionable, a mixture of orchard grass and red clover is suggested. For a quick temporary lawn, Italian rye grass has proved very successful.

Color inheritance in the petunia, V. V. Westgate (*Amer. Breeders' Assoc. [Proc.], 6 (1909), pp. 459–462*).—Some data are given covering the F_1, F_2, and F_3 results of color studies which the author is conducting with the bell portion of petunia flowers.

Fertilizers for the florist, H. B. Dorner (*Amer. Florist, 36 (1911), No. 1204, pp. 1182–1184*).—A paper delivered before the Illinois State Horticultural Society.

FORESTRY.

Forest conditions in Illinois, R. C. HALL and O. D. INGALL (*Bul. Ill. State Lab. Nat. Hist., 9 (1911), Art. 4, pp. 175-253, pls. 17, fig. 1*).—This report is based upon a cooperative study undertaken by the Forest Service of this Department and the Illinois State Laboratory of Natural History. It discusses in detail the soil areas and forest types of southern and of northern Illinois, the distribution of tree species, including a list of 129 trees native to Illinois, the ownership and taxation of forest lands, and the various timber industries of the State. Suggestions are then given relative to the general methods of forest management, and to management for special objects and of various forest types. The question of forest protection is also discussed.

The investigation shows in brief that there are nearly a million acres of forests in the 26 counties estimated, most of which are more suitable for timber production than for agriculture. The woodlands are nearly all divided into small tracts and owing to their poor silvicultural condition their productive capacity is much below normal. It is recommended that the State adopt a progressive forest policy to be administered through a nonpartisan board of forestry and a technically trained state forester. The chief features of the policy consist in the adoption of an adequate state fire protection system, the inauguration of an educational campaign, and further investigations of the problems involved in developing and extending Illinois woodlands. A proposed forest law embodying the above policy is presented.

A bibliography relating to forest conditions in Illinois is appended

Report of the state forester, S. N. SPRING (*Connecticut State Sta. Rpt. 1909-10, pt. 11, pp. 775-804, pls. 3*).—Aside from a brief statement relative to the various lines of work being undertaken, this report deals wholly with the subject of forest fires, especially with those of 1910. The phases considered include the fire warden service, statistics of forest fires in 1909 and in 1910, measures of control and prevention of forest fires, enforcement of forest laws, economic results of forest fires, statistics by towns, and a list of the town fire wardens in 1911.

Report of the professor of forestry, E. J. ZAVITZ (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 269-273, figs. 6*).—This is chiefly a progress report on the reclamation of waste land and forest nursery operations at the forest station in Norfolk County. A table taken from the Ontario Bureau of Industries report for 1908 is given showing the percentages of woodland and slash land in the various counties of southwestern Ontario.

Reports on the forest administration in Burma for the year 1909-10 (*Rpts. Forest Admin. Burma, 1909-10, pp. 3+9+11+195+9*).—This consists of the usual progress reports on the administration of the state forests of the Pegu, Tenasserim, Northern, and Southern Circles of Burma for the year 1909-10. The more important data relative to forest reserves, settlement, surveys, working plans, forest offenses and protection, plantations, and other miscellaneous work, revenues, expenditures, etc., are appended in tabular form.

Micrography of the woods of Javanese trees, J. W. MOLL and H. H. JANSSONIUS (*Mikrographie des Holzes der auf Java vorkommenden Baumarten Leyden, 1911, vol. 2, pt. 3, pp. 161-540, figs. 49*).—This is a progress report on the study of the wood anatomy of Javanese trees which the authors have conducted since 1903. Some 100 additional species are described along the lines previously noted (E. S. R., 20, p. 1134).

Chaparral.—Studies in the dwarf forests, or elfin-wood, of southern California, F. G. PLUMMER (*U. S. Dept. Agr., Forest Serv. Bul. 85, pp. 48, pls. 8, figs 7*).—This bulletin comprises a study of the chaparral region of southern

California, including suggestions for its management and improvement. Consideration is given to the distinguishing characteristics of the true chaparral as compared with the dwarf trees and brush growth found in other arid sections of the United States, historical records of past forest conditions in the chaparral region, geographic conditions in the chaparral area, chaparral and the water supply, vertical range of chaparral, composition by species, amount of shade produced, value of the different species, representation of desirable and undesirable species on the Tujunga and San Gabriel watersheds, commercial uses, protection against fire, restocking after fires, and the introduction of larger tree species in the chaparral.

At the present time the chaparral is chiefly of value as a protection for watersheds. It also furnishes materials for fencing and for browsing of cattle, sheep, and goats when pasturage is scarce and for bee pasturage. A study of the existing conditions leads to the conclusion that larger tree species can be made to take possession of the chaparral regions by artificial extension alone. Experimental planting operations thus far made by the Forest Service and others have only been partially successful and indicate that the task will require patience and a thorough knowledge of the best planting methods.

The management of second-growth sprout forests, H. S. Graves (*U. S. Dept. Agr. Yearbook 1910, pp. 157–168, pls. 2*).—This article deals particularly with the management of young stands of hardwood in the Northeast which have come up after the removal of the virgin forests or of a subsequent forest. Certain broad principles of handling second-growth hardwoods are considered under the following general headings: Simple coppice or sprout system, holding over reserve trees, sprouts and standards, handling older sprout stands, and improvement cuttings.

Treatment of artificial tree plantations, E. Secrest (*Ohio Sta. Circ. 110, pp. 21, figs. 16*).—The cultural treatment of tree plantations is briefly discussed, special attention being given to the pruning requirements of different species. A number of illustrations accompany the text.

Fire prevention and control on the National Forests, F. A. Silcox (*U. S. Dept. Agr. Yearbook 1910, pp. 413–424, pls. 6*).—In this article general consideration is given to the importance of fire protection, the character of the region to be protected, economic losses, and the causes of fires. Various methods of fire prevention and control as employed in the National Forests are then described.

Progress in saving forest waste, W. L. Hall (*U. S. Dept. Agr. Yearbook 1910, pp. 255–264, pls. 3*).—In this article the author points out how forest waste occurs, shows a number of ways in which the waste is being saved, and suggests further methods of cutting down the loss.

National problems affecting the lumber industry (*Rpt. Nat. Lumber Manfr. Assoc., 9 (1911), pp. 278*).—This is an official report of the ninth annual convention of the National Lumber Manufacturers Association, Chicago, 1911, including papers and discussions on a number of problems affecting the lumber industry.

Rubber and gutta-percha, E. Tassilly (*Caoutchouc et Gutta-percha. Paris, 1911, pp. XVIII+395+XII, figs. 56*).—A handbook of information dealing with the history of the rubber industry, preparation and treatment of crude rubber, vulcanization, etc. The concluding chapters contain a chemical study of rubber and gutta-percha, together with analyses of the crude and manufactured products as determined by various methods.

The germination of Hevea seeds (*Agr. News [Barbados], 10 (1911), No. 233, p. 111; Agr. Bul. Straits and Fed. Malay States, 10 (1911), No. 6, pp. 192–194*).—The results are given of experiments conducted by G. G. Auchinleck in

Grenada to determine the cause for the low percentage of germination of the seeds of *Hevea brasiliensis.*

The investigation shows that all light seeds should be rejected in making selections for plantings. Seeds which were kept in the air lost 6 per cent of their weight in 2 weeks' time, whereas seeds packed in dried charcoal lost 20 per cent of their weight, the latter being about the extreme limit of desiccation. The loss of weight appears to coincide with loss of germinating power and desiccation apparently takes place in some instances even before dehiscence of the capsule. It appears that without special precautions Hevea seeds will lose their germinating power within 2 or 3 weeks after the ripening of the capsules. It is considered important that no Hevea seed should be sold until it has been selected rigorously by weight, nor should any unnecessary exposure or loss of time in planting be allowed.

Ceara rubber (*Bul. Imp. Inst.* [*So. Kensington*], *9* (*1911*), *No. 1, pp. 1–8*).—Analyses based on examinations made by the Imperial Institute are given of specimens of Ceara rubber from Ceylon, Uganda, East Africa Protectorate, Nyasaland, Sudan, and Southern Nigeria.

DISEASES OF PLANTS.

Report of the botanist for 1909 and 1910, G. P CLINTON (*Connecticut State Sta. Rpt. 1909–10, pt. 10, pp. 713–774, pls. 8*).—This report includes notes on diseases in relation to weather in 1909 and 1910, new observations on diseases previously reported, diseases or hosts not previously reported, spraying potatoes in dry seasons, and a study of the formation of the oospores of potato blight (*Phytophthora infestans*)

The following diseases were found to be prevalent or unusually severe during 1909: Black rot, rust, scab, and spray injury on the apple; rust on the ash; bark disease on the chestnut; wilt on the eggplant; leaf spot on the elm; leaf mold and anthracnose on the muskmelon; brown rot (on twigs) and leaf curl on the peach; black knot on the plum; tip burn and scab on the potato; leaf blight on the quince; rust on the rose; leaf mold on spinach; powdery mildew and winter injury (to roots) on the strawberry; and calico on tobacco. During 1910 the following diseases were noted: Rust, scab, frost, and spray injury on the apple; black knot on the cherry and plum; bark disease and drought injury on the chestnut; smut on corn; rust on the hollyhock; leaf scorch on the maple; mildew blight on the muskmelon; leaf curl and brown rot (of twigs) on the peach; scab on the pear; pine-sweetfern rust on the pine; rot (blight) and tip burn on the potato; powdery mildew on rye and barley; rust on the quince; and anthracnose on the sycamore.

It is claimed that successive droughts for the past 4 years have affected the forest trees, especially pines and chestnuts, making the latter more susceptible to the chestnut bark disease, and also that the unusual winter of 1904 seriously injured the chestnuts so that the bark disease fungus (*Diaporthe parasitica*) became actively parasitic. The uredo and teleutospore stages of *Pucciniastrum myrtilli* (*Peridermium peckii*), the hemlock-heath rust, is reported on various species of blueberries and huckleberries. In discussing the so-called blight of the white pine, the author claims that it is due primarily to adverse weather conditions, such as winter, drought, and frost injuries. Specimens of *D. parasitica* have been collected on the Japanese chestnut (*Castanea japonica*) in a local nursery, and are also reported on *C. sativa* and *C. pumila.* The pine-sweetfern rust (*Cronartium comptoniæ*) is reported on *Pinus rigida*, *P. austriaca*, and *P. maritima.* The pine-currant rust (*Cronartium ribicola*), which had been reported from several localities in the State on white pine seedlings, has been apparently eradicated.

The results are given of potato spraying experiments with Bordeaux mixtures, in which the influence of the character of the fertilizer (stable manure *v.* nitrate of soda) used, the system of cultivation (ridged or flat), and the effect on the late blight and scab of the potato of growing successive crops of potatoes on the same land are investigated. The benefits other than fungicidal derived in a dry season from the use of Bordeaux and arsenate of lead sprays are believed by the author to be due to the conservation of moisture in the leaves during dry seasons by clogging the stomata and water pores with the sediment of the spray. Details are also given of experiments in spraying conducted during 1906, 1907, 1908, and 1909. In both wet and dry years increased yields were obtained by spraying with a 4:4:50 Bordeaux mixture.

The author describes in detail studies on the formation of oospores of the potato blight, including media used, variability of oospore production, microscopic characters of the oospores, and hybrids, a preliminary account of which has been previously noted from another source (E. S. R., 25, p. 348). The best culture medium for the production of oogonia, antheridia, and oospores was found to be an oat-juice agar prepared as follows: Fifty gm. of ground oats mixed with from 300 to 350 cc. of water was cooked for 30 minutes in a covered dish with steam from an autoclave run in by means of glass and rubber tubing, and after straining the coarser materials off, 10 gm. of agar was added and the mixture steamed for another 30 minutes. The mixture was then brought up to 500 cc. by adding water if necessary, poured into test tubes, and sterilized for 15 minutes under from 7 to 10 lbs. pressure. This was the only medium in which the author was able to obtain perfectly developed and mature antheridia and oospores. It was also found that the best condition for oospore production is between neutrality and 15 cc. acidity of the medium.

Fungi and plant pathology, S. B. McCready (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), p. 37*).—A report is made on the diseases examined during the year, and on experiments for the control of black rot of the apple (*Sphæropsis malorum*). The characteristics of stinking smut and loose smut of grain are given, together with a brief description of the accepted methods for combating them.

Four little-known British fungi, W. B. Grove (*Jour. Econ. Biol., 6 (1911), No. 2, pp. 38–49, pls. 2, fig. 1*).—Descriptions are given of *Mucor spinosus*, which ferments glucose but not sucrose, of *M. spinosus recurvus*, of *Rhopalocystis nigra*, which is a convenient source of invertase and emulsin, of *Monilia lupuli* found on the surface of spent hops when exposed in heaps to the air, and of *Hormodendron cladosporoides*.

The article closes with a brief discussion of the differences between certain species of Hormodendron and closely related Penicillium species.

Studies on Corticium javanicum, A. Rant (*Meded. Dept. Landb.* [*Dutch East Indies*], *1911, No. 13, pp. 38, pls. 7*).—In a general study of this fungus the author cites its known hosts, gives its distribution, describes the characteristics of the disease, and gives the results of inoculation experiments with the fungus from various hosts and localities, methods of infection, and means of combating the disease.

The following hosts are listed: *Coffea* spp., *Bixa* sp., *Thea* spp., *Bœhmeria* spp., *Cinnamomum zeylanicum*, *Cola acuminata*, *Indigofera* spp., *Duranta plumieri*, *Erythroxylon coca*, *Theobroma cacao*, *Cinchona* spp., *Hevea brasiliensis*, *Myristica fragrans*, *Eriodendron anfractuosum*, *Piper nigrum*, *Acacia farnesiana*, *Anona* spp., *Achras sapota*, *Citrus* spp., *Cynometra ramiflora*, *Mangifera* spp., *Erythrina* spp., *Thuja* spp., *Castilla elastica*, *Ficus* spp., *Murraya* *exotica, Plumeria acutifolia, Thephrosia purpurea, Polygonum chinense, Debregeasia longifolia, Rauwolfia javanica, Cypholophus lutescens, Lantana camara, Eriobotrya japonica, Melochia indica, Dombeya wallichii, Eupatorium ianthinum, Diospyros kaki, Claoxylon indicum, Macropanax oreophilum, Homalanthus populneus, Urena tomentosa, Saurauja* spp., *Trema orientalis, Eucalyptus saligna, Cassia* spp., *Cedrela sinensis, Cestrum aurantiacum, Lansium domesticum, Artocarpus integrifolia, Orthosiphon stamineus, Gardenia florida, Sesbania ægyptiaca, Clerodendron macrosiphon, Cupressus glauca pendula, Stachytarpheta dichotoma, Allamanda hendersoni, Hibiscus* spp., and *Nerium oleander.*

Four forms of the disease are given, viz, (1) the typical fruit-bearing form of *C. javanicum*, (2) whitish, knot-like rhizomorphs, (3) white, glistening, cobweb-like fungus threads called the cobweb mycelium, and (4) the *Necator decretus* form. It is claimed that the general method of infection is as follows: First, the spores of Corticium or Necator fall on a branch. These spores on germination form the cobweb mycelium stage in which the fungus lives as a saprophyte. From this develops the knot-like rhizomorphs, which finally infect the living tissues of the host, followed eventually by the fruiting form of Corticium and Necator, by which time the attacked portion is usually dead. From cross-inoculations with the different forms of this organism on various hosts, the conclusion is reached that the cobweb mycelium, the knot-like rhizomorphs (sclerotia), and *N. decretus* are but different stages in the life history of *C. javanicum.*

[Pear blight and alfalfa leaf spot], S. F. Edwards (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 163–168, figs. 3*).—In a report on pear blight, prepared by D. H. Jones, it is claimed that this disease has been prevalent on both apple and pear trees, but not so seriously as last year. In one young orchard trees were found which had been inoculated with the disease by the buffalo tree hopper to such an extent that twigs, limbs, and bark were all badly infested. The characteristic slit punctures of the tree hopper were found in rows on the trunks of the young trees, and from these punctures the disease had spread until in some cases the tree was completely girdled and killed. In another orchard conclusive evidence was found that the shot-hole bark-boring beetle (*Scolytus rugulosus*) was a carrier of the blight, as many of the trees had shot-hole borings around which the blight had extended producing the characteristic blight cankers.

A leaf spot (*Pseudopeziza medicaginis*) of alfalfa is also discussed and described.

Rhizoctonia medicaginis in America, F. D. Heald (*Phytopathology, 1 (1911), No. 3, p. 103*).—Attention is called to previous notes on the occurrence of this disease in America (E. S. R., 18, p. 244: 20, p. 437), and a brief description is given of the symptoms of the disease and the damage done by it in an infected alfalfa patch in Nebraska.

New hosts for Sclerospora macrospora, G. Severini (*Staz. Sper. Agr. Ital., 43 (1910), No. 10, pp. 774–786, pls. 2*).—The hosts listed are as follows: *Hordeum vulgare, Tricticum sativum, Avena sativa, Festuca elatior, Alopecurus agrestis, Lolium temulentum,* and *Agropyrum repens*, of which *H. vulgare* and *F. elatior* are said to be new hosts for this fungus.

Sphacelotheca reiliana on Sorghum halepense, O. Munerati (*Staz. Sper. Agr. Ital., 43 (1910), No. 10, pp. 718–722, figs. 2*).—Attention is called to the occurrence in Italy of this smut on Johnson grass.

Rhizoctonia of buckwheat, F. L. Stevens and G. W. Wilson (*Abs. in Science, n. ser., 33 (1911), No. 859, p. 943*).—At the tenth annual meeting at Raleigh of the North Carolina Academy of Science mention was made of the serious outbreak of Rhizoctonia on buckwheat in the western part of the State.

Notes on the value of treating the seeds of winter cereals with corrosive sublimate, L. HILTNER (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 9 (1911), No. 5, pp. 69–79, fig. 1*).—After a brief discussion of the value of soaking the seeds of wheat and rye in a corrosive sublimate solution as a means of protection against Fusarium and other fungi, the spores of which cling to the surface of the grains, the author gives reports obtained from many grain growers on the effects of the formalin treatment of the seed and on the germination and vigor of growth.

It is claimed that no injuries resulted to the grain from the corrosive sublimate treatment, and that better germination and more vigorous growth were obtained.

The action of some fungicides on the germination of certain varieties of wheat and oats, G. D'IPPOLITO (*Staz. Sper. Agr. Ital., 43 (1910), No. 10, pp. 735–757*).—The effects on the germinative power and length of germination when the seeds of various varieties of wheat and oats were treated with sulphate of copper and milk of lime are given.

It was found that a 0.5 per cent solution of copper sulphate lowered more or less the degree of germination and the germinative energy on all the varieties tested except 2 of wheat, while a seed treatment with a 0.25 per cent solution of copper sulphate did not injure the germinative power of the grain, nor did it increase the period of germination. A 5 per cent solution of milk of lime did not injure the germination of the treated grain in any way, but on the contrary was beneficial to it except in the case of 2 varieties of oats.

A bibliography is appended.

Bean diseases, S. B. MCCREADY (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 44–47, figs. 2*).—The author describes 3 common and serious bean diseases, viz, anthracnose (*Colletotrichum lindemuthianum*), bacterial blight (*Pseudomonas phaseoli*), and pod and stem rot (Rhizoctonia), and gives methods for their control.

Results of a practical attempt to control lettuce sclerotiniose, F. L. STEVENS (*Abs. in Science, n. ser., 33 (1911), No. 859, p. 941*).—At the tenth annual meeting at Raleigh of the North Carolina Academy of Science the author reported the results of experiments on the control of lettuce sclerotiniose. From the studies made it was decided that all the fungus structures except the sclerotia are short-lived, and, therefore, that if the formation of new sclerotia could be prevented, diseased beds could be eventually restored to health.

To test this, several experimental beds were thoroughly infected in 1908, and the sclerotia which formed were allowed to remain in the beds. The following year over 45 per cent of the lettuce died with sclerotiniose. From this time on a course of treatment designed to prevent the formation of sclerotia was followed, with the hope of lessening the disease. The following year only ½ of 1 per cent of the crop died. A year later (1911) the results were almost the same.

Tomato blight and rot in Virginia, H. S. REED (*Virginia Sta. Bul. 192, pp. 16, figs. 9*).—After a general discussion of the characteristics of these 2 diseases and of their serious menace to tomato growing in southern Virginia, the author gives the results of spraying and fertilizer experiments conducted during 1910 at Christiansburg and Blacksburg on the control of these diseases.

The experiments consisted of from 2 to 4 applications of 4:5:50 Bordeaux mixture, 1:33 and 1:50 commercial lime sulphur, and of applications to the soil around the plants of sulphur (a handful to each plant), sulphate of potash (300 lbs. per acre), acid phosphate (300 lbs. per acre), lime (1 ton per acre), and stable manure (15 tons per acre).

From 3 to 4 applications of the 4:5:50 Bordeaux mixture proved uniformly successful in controlling both the tomato blight (*Septoria lycopersici*) and rot (*Phytophthora* sp.). The 1:33 and 1:50 lime-sulphur sprays acted variably, giving good results in 1909, but they were not nearly so efficient in 1910 in controlling these 2 diseases as the Bordeaux mixture. The various sprays were applied July 11 to 12, August 1 to 2, August 15 to 18, and September 2. The treatments with sulphur, manure, or fertilizers had no effect in controlling these diseases.

Parasitism of Coniothyrium fuckelii, P. J. O'Gara (*Phytopathology, 1 (1911), No. 3, pp. 100–102, pls. 4*).—The author reports the results of successful inoculation and cross-inoculation experiments with this organism on both apples and roses.

The disease was first observed in 1903 on apple twigs and young apple trees from South Carolina. These specimens showed cankers of various sizes, the surface of which bore numerous minute pycnidia. Young apple trees were infected just above the crown, and in the earlier stages of the disease the bark tissues still adhered to the wood, but in the older infections the dead bark broke away. About the same time specimens of diseased rose stems affected with canker were found at Washington, D. C., which on examination proved to be very similar to the apple canker. Subsequent growth in pure cultures and cross inoculations from both hosts to apple and rose proved the identity of the 2 organisms.

This organism also causes a fruit rot of the apple, in which circular, brownish, and somewhat sunken areas are produced. The diseased area is smooth at first, and later becomes somewhat wrinkled, while the mycelium in the earlier stages is densely white, and later becomes brown. The apples are often completely rotted when attacked by the disease. In South Carolina most of the infection occurred where the bark had been injured by tools and cultivating. Nursery stock adjoining a clump of wild roses badly attacked by the disease was seriously infected.

A dangerous apple disease, F. L. Stevens and G. W. Wilson (*Abs. in Science, n. ser., 33 (1911), No. 859, p. 942*).—In a paper read before the tenth annual meeting, at Raleigh, of the North Carolina Academy of Science, attention is called to a serious apple disease which appeared in 1908.

The disease is characterized by whitish or pinkish pustules on the younger twigs and about the crotches of the tree, from which numerous spores of the Fusarium or Tubercularia type develop. The infection is in the bark, the diseased areas shrinking and separating. The epidermis splits away, exposing the brown surface beneath, or the pustules merely break through the epidermis, especially near the lenticels. Upon older twigs the bark cracks longitudinally, exposing rows of pustules in the cracks. A pinkish mycelial growth sometimes appears on the diseased twigs. No ascigerous stage has been found.

Spraying for apple scab, S. B. McCready (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), p. 42*).—A report is made on an experiment to test the efficiency of lime sulphur in controlling apple scab and black rot.

The orchard on which the test was made had never been sprayed and was bady infested with these diseases. Three sprayings were given, viz, the first with home-boiled lime sulphur just before the leaves opened, the second with a 1:30 commercial lime-sulphur solution applied as the blossom buds were opening, and the third with a 1:30 commercial lime sulphur when the blossoms were falling. Arsenate of lead was used as the insecticide.

At harvest time it was found that 90 per cent of the apples were free from scab, and very few showed any signs of black rot, while other nearby unsprayed orchards were badly attacked by the scab.

A preliminary report on the effects of arsenical compounds upon apple trees, D. B. SWINGLE and H. E. MORRIS (*Phytopathology, 1 (1911), No. 3, pp. 79–93, pls. 2*).—The results are given of experiments made in an orchard which had never been sprayed with any arsenical, in which the effects on the bark of fruit trees of the common insecticides were tested. Tests were also made as to which compounds are the most injurious, and the nature and extent of the injuries.

The following compounds were applied: Arsenic acid (pure), arsenic trioxid (highest purity), arsenic disulphid, arsenic trisulphid (technical), calcium arsenite, lead arsenate (technical), Paris green, sodium arsenite (pure), and zinc arsenite. The chemicals were applied to branches from ½ to 2½ in. in diameter, on bands of absorbent cotton which were wrapped about the limbs in such a manner that the chemicals made a uniform layer of about 4 in. wide, and were kept wet with distilled water. Crowns from 3 to 5 in. in diameter were also treated, by digging a shallow trench close around the tree, partly filling it with the chemical suspended in water, and replacing the earth. Tabulated data are given showing the kind of arsenical used, the amount of the arsenical by weight, the variety of tree treated, the diameter of the treated portion, wounds under the bandage holding the chemicals, and the extent and character of injury. Investigations were also made as to the number of cells in the corky layer of smooth bark and in the furrows of rough bark.

It was found that serious injury to apple trees may result under certain conditions from the application of so-called insoluble arsenicals, and that recent wounds through the outer bark, functional lenticels, and dormant buds permit the absorption of arsenicals in solution, recent wounds being especially dangerous. The cutting off of water sprouts from the bases of trees in early spring and the subsequent accumulation of arsenicals used as insecticides about the unprotected wounds were found to be dangerous. White-lead paint applied to these wounds will protect against arsenical injury, even when the paint is put on just before the spraying.

The most noticeable symptoms of rapid arsenical injury through the bark are a discoloration of bark and outer wood along definite lines up and down the stem and a dull spotting of the leaves, followed by wilting, shriveling, and drying. The injury seems to be due more to the soluble impurities in the arsenicals than to the slight solubility of the compounds themselves. Arsenic trisulphid when applied to the bodies of trees did not seem to be more safe than the other arsenicals in common use, but zinc arsenite gave practically no injuries under the most severe tests.

Researches on the diseases of the grape, J. CAPUS (*Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), No. 4, pp. 456–464*).—Two lines of study are reported, one on the spread of the black rot and mildew in 1909, and the other on the comparative efficacy of different copper sprays as determined by the length of action of each on the vines.

It is stated that 2 sets of conditions govern the ease with which these diseases attack the grape, as follows. The first set includes diminished daily growth of the branches, the disappearance of starch from the upper internodes, and the cessation of growth of the rootlets, accompanied by heavy rains which wet the earth and by a lowering of the temperature. The second set includes the atmospheric conditions such as sufficient warmth and moisture for the germination of the spores. When these 2 sets of conditions coincide the infection will be certain and rapid, and the intensity of each attack under these favorable conditions will be determined by the number of spores which exist in the neighborhood of the vines.

As to the various sprays tested, the author lists the following in order of efficiency: (1) Bordeaux and Burgundy mixtures (3 to 4 parts to 100 of copper sulphate); (2) Burgundy (2:100), Bordeaux (2:100), Burgundy (2:100 with colophony), Bordeaux mixture plus molasses, Burgundy (2:100 plus soap), and copper acetate (1:100 and 2:100); (3) Burgundy and Bordeaux mixtures (2:100, applied 4 and 8 days after mixing); (4) Bordeaux and Burgundy mixtures (1:100); (5) oxychlorid of copper (500 gm. per hectoliter); (6) oxychlorid of copper (300 gm. per hectoliter), ammoniate of copper (1:100 and 2:100); (7) chlorid of copper (240 gm. per hectoliter); and (8) aceto-arsenite of copper (200 gm. per hectoliter), and sulphate of copper (150 to 300 gm. per hectoliter).

Spraying for black rot of the grape in a dry season, D. Reddick, C. S. Wilson and C. T. Gregory (*New York Cornell Sta. Bul. 296, pp. 573–588, figs. 4*).—The results are given of experiments conducted during 1909 and 1910 on spraying with ammoniacal copper carbonate, Bordeaux, and lime-sulphur mixtures for the control of the black rot of the grape, in continuation of previous work (E. S. R., 21, p. 344).

The experimental plats were located in a vineyard from which no grapes had been picked for many years because of the ravages of the black rot and downy mildew. The sprays used during 1909 were 4:4:50 Bordeaux mixture (4 and 5 applications), 3:3:50 Bordeaux mixture (5 applications), 10:6:50 ammoniacal copper carbonate (5 applications), 1:25, 1:30, and 1:40 commercial lime-sulphur mixture (5 applications), and 8:8:50 self-boiled lime-sulphur mixture (5 applications). Some tests were also made with bagging the fruit as a means of controlling the disease.

In 1910 the sprays used were 4:4:50 Bordeaux mixture (2, 3, and 4 applications), 1:50 and 1:65 commercial lime-sulphur mixture (4 applications), 8:8:50 self-boiled lime-sulphur mixture (4 applications), and 5:3:50 ammoniacal copper carbonate (4 applications).

The results from these experiments for the 2 seasons showed that with the best fungicide used for controlling the black rot the applications necessary to control the disease were applied with actual loss when compared to the yields during these 2 years from the unsprayed vines. All of the sprays used were ineffective against the rot except the 4:4:50 Bordeaux mixture, which maintained its preëminence as a spray for black rot. The time of application of the sprays proved to be the most important single factor in the control of this disease.

The author recommends clean culture of the vineyard grounds, the destruction of all mummies left on the vines, keeping the vines clear of basal trailing sprouts, and spraying with a 4:4:50 Bordeaux mixture, the first application of the mixture being made when the third leaf is showing, the second just after the fall of the blossoms, and two other applications at intervals of 10 to 14 days, according to the weather conditions. Each application should precede rather than follow a rain, as it was found that an infection followed only a rain of some duration.

The conditions of resistance of the vines to mildew, J. Laurent (*Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), No. 4, pp. 464–471*).—The substance of this article has previously been noted from other sources (E. S. R., 25, p. 45).

Scaly bark or nail-head rust of citrus, H. S. Fawcett (*Florida Sta. Bul. 106, pp. 1–41, figs. 22*).—This bulletin comprises the results of several years' study of this disease, in which the cause of scaly bark, means of control, symptoms, distribution, history, and development were investigated; inoculation experiments and experiments for the control of the disease are also given. The cause of the disease, methods of control, and inoculation experiments have been previously noted from other sources (E. S. R., 23, p. 446; 25, p. 450).

The disease has been known on the Pinellas Peninsula, Florida, for at least 30 to 40 years, but has done little damage until recently. It is caused primarily by *Cladosporium herbarum citricolum*, but is associated with the withertip fungus (*Colletotrichum glaosporioides*), which is an important secondary agent in the destruction wrought by the disease. The cultural characteristics of *C. herbarum citricolum* on various media and in comparison with *C. herbarum* are given. Inoculation experiments with pure cultures of the fungus on young orange trees in the greenhouse and on unripe oranges in the laboratory resulted in the formation of spots similar to scaly bark spots.

From the experiments conducted on the control of this disease the following conclusions are drawn: (1) The disease yields to spraying with Bordeaux mixture; (2) pruning out of the dead wood lessens subsequent infection; (3) carbolineum, one-half strength, painted over the bark after heading back, is followed by a vigorous growth free from the disease; (4) neither spraying with 1 per cent solution of carbolineum nor spreading copper sulphate in the form of crystals on the ground was found to be of any practical value in controlling the disease.

In conclusion, it is stated that scaly bark is a disease of the fruit and bark, mainly of the sweet orange, and occurs in only a few localities in Florida. In addition to the other remedies for controlling this disease, it was found that budding or grafting to resistant varieties of citrus, such as pomelo, mandarin, and tangerine (*Citrus nobilis*) was effective.

A bibliography is appended.

The double blossom of the dewberry (Fusarium rubi), M. T. COOK (*Delaware Sta. Bul. 93, pp. 3-12, figs. 12*).—In addition to a discussion of the distribution and characteristics of this disease, to which attention had been previously called by the author (E. S. R., 23, p. 453), a study is reported of the penetration of the fungus into the tissues of the host, spore distribution, method and time of infection, damage done by the fungus, and of methods for its control.

It was found that the mycelium of the fungus (*F. rubi*) did not penetrate the tissues, but grew between the various elements of the leaf bud. Later, however, the flower buds are penetrated by the mycelium, and the hyphæ enter the ovaries by way of the stigma and style and form a mass of mycelia in the ovary cavity. Conidia are produced within 48 hours after the opening of the flower buds. These spores fall on the young buds which are forming for the next year, germinate, and grow inward, where the mycelium remains dormant until the following spring. The disease is said to be more severe on the Lucretia and Rathbone varieties of the dewberry, but attacks many species and varieties of the genus Rubus. It is claimed that as the mycelium does not penetrate beyond the base of the buds, the hand-picking of the diseased buds, which are easily recognized by their somewhat more swollen and reddish appearance in the early spring, should prove an effective means of control. Experiments comparing hand-picking and spraying showed that hand-picking kept the disease in check though not eradicating it completely, while spraying proved ineffective in combating it.

Is Bacillus coli ever a plant parasite? J. R. JOHNSTON (*Phytopathology, 1 (1911), No. 3, pp. 97-99*).—The results of inoculation experiments with this organism on the coconut are reported, as well as inoculation and cultural studies of certain organisms isolated from the bud rot of the coconut palm.

As a result of these inoculations and the subsequent cultural studies, the conclusion is drawn that at least one organism capable of causing the bud rot of the coconut palm has been identified, and after a careful study of the organism and comparison with *B. coli* it was found impossible to ascertain any characters by which the coconut organism could be distinguished from the *B. coli* received from the animal pathological laboratory.

It is concluded, therefore, that either *B. coli* or a form indistinguishable from it by our present method of research is the cause of the coconut bud rot.

A pine disease (Diplodia pinea), K. Bancroft (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1911, No. 1, pp. 60–62*).—The author reports a study of the mode of entrance and the range of hosts of a fungus (*D. pinea*) found in the diseased shoots of *Pinus insignis* and *P. montana* from Cape Colony.

The disease is confined to the terminal portions of the shoots, and is characterized by the yellowing and subsequent shedding of the leaves, followed by the death of from 10 to 18 in. of the terminal portion of the shoots. These dead shoots remain attached to the tree, and furnish successive crops of spores. The hyphæ usually occur in the cortex and phloem, but may extend into the wood along the medullary rays.

Inoculation experiments with the spores of this fungus on unbroken surfaces of the host gave negative results, but when drops of water containing spores were placed on wounded surfaces infection occurred. In the experiments reported species of Pinus were readily infected through wounds, but not Picea, Abies, or Larix.

The rusts of Tsuga canadensis, P. Spaulding (*Phytopathology, 1 (1911), No. 3, pp. 94–96, figs. 2*).—The author reports the occurrence and range of *Peridermium peckii* and *P. fructigenum*, of which *Cæoma tsugæ* is a synonym. The latter occurs in 2 forms, one on the scales of the green cones and the other on the young newly formed shoots of *T. canadensis*.

Fungus diseases; their relation to Para rubber cultivation in the West Indies, K. Bancroft (*West India Com. Circ., 26 (1911), Nos. 329, pp. 220–223; 330, pp. 245–247; 331, pp. 268–270*).—The author gives the characteristics of the following diseases, and suggests methods of control for several of them: Root diseases caused by *Fomes semitostus, Hymenochate noxia, and Sphærostilbe repens;* stem diseases caused by *Corticium javanicum, Thyridaria tarda* (*Diplodia cacaoicola*), *Phytophthora faberi*, thread blight fungus, die back (*Glœosporium alborubrum* and Diplodia), and *Eutypa caulivora;* leaf diseases caused by *Pestalozzia guepini, P. palmarum*, and several minor fungi; and a fruit disease due to *Phytophthora faberi*.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Progress of game protection in 1910, T. S. Palmer and H. Oldys (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 80, pp. 36, fig. 1*).—In this annual report on the subject (E. S. R., 23, p. 253), it is shown that the year 1910 was marked by steady progress in the movement for the increase of game by propagation and the establishment of game preserves. A chronological record of events relating to game protection during the year is appended.

The game market of to-day, H. Oldys (*U. S. Dept. Agr. Yearbook 1910, pp. 243–254, maps 6*).—In this paper the author discusses the early abundance of game, the increase in prices of game, present condition of game, causes of decrease, restrictive laws, markets, and the present market supply.

Killing ground squirrels, W. D. Foster (*Washington Sta. Popular Bul. 35, pp. 4*).—As the result of serious injury to corn on the college farm in 1904 considerable poison was used during the remainder of the year, but apparently without much effect.

In March, 1905, 200 steel traps were set, uncovered and unbaited, each trap being visited at least twice daily. Poison was also used to a moderate extent. A total of 925 squirrels was killed, at an estimated cost of $92. In 1906 the same methods and more traps were employed and 1,656 squirrels killed, at a cost of $112. In 1907, 170 acres were added to the college farm, making a total of over 400 acres, 1,875 squirrels being killed, at a cost of $170. The work was continued through to 1910, 1,764 squirrels being killed in 1908, 1,280 in 1909, and 460 in 1910, the cost being $172, $140, and $28, respectively.

The average cost of killing squirrels for the entire period was a little less than 9 cts. each, exclusive of the cost of the traps. It was found that, aside from the necessary protection to the experimental plats and crops, the squirrels were destroyed at a cost much below the damage which they would have caused if allowed to remain. As an argument in favor of trapping rather than poisoning, the author cites a case in which 60 horned larks were killed on a 5-acre field by poison intended for squirrels.

Rats and fleas in their relation to bubonic plague, A. H. Jennings (*Proc. Canal Zone Med. Assoc., 1910, Apr.–Sept., pp. 119–133*).—The author here reports upon investigations made of the species of rats and fleas and their distribution in the city of Panama and the Canal Zone.

The rats trapped in the routine work of the Panama Department of Health were delivered to the Board of Health Laboratory, where they were chloroformed and searched for fleas. In all, 2,292 rats of four species were examined. They were brown rats, 1,513; black, 653; roof, 77; mouse, 49. From these rats 2,784 fleas were taken. Single rats often greatly exceeded the average of their species, the highest number for one rat being 39 fleas. But two species of fleas were taken from the rats examined, the Indian rat flea, *Xenopsylla cheopis*, and the cat flea, *Ctenocephalus felis*, the former forming 97.9 per cent of the entire number. Three other species of fleas, namely, the European rat flea, *Ceratophyllus fasciatus;* the European mouse flea, *Ctenopsylla musculi;* and the human flea, *Pulex irritans*, have, however, been taken from or are thought to occur in the Canal Zone.

A tabulated summary is given of the relationship of rats and fleas taken from districts in the city of Panama.

The migratory movements of birds in relation to the weather, W. W. Cooke (*U. S. Dept. Agr. Yearbook 1910, pp. 379–390, map 1*).—The data here presented are based on 400,000 records.

It is shown that "weather conditions are not the cause of the migration of birds, but that the weather, by influencing the food supply, is the chief factor which determines the average date of arrival at the breeding grounds. Migration is undertaken in response to physiological changes in birds, and the date of starting in the case of most species bears no relation whatever to the local weather conditions in the winter home. The weather encountered en route influences migration in a subordinate way, retarding or accelerating the birds' advance by only a few days and having a slight relation to the date of arrival at the nesting site. Local weather conditions on the day of arrival at any given locality are minor factors in determining the appearance of a species at that place and time. The major factors in the problem are the weather conditions far to the southward, where the night's flight began, and the relation which that place and time bear to the average position of the bird under normal weather conditions. . . .

"Another conclusion equally apparent is that neither the time of migration, the route, nor the speed of one species can be deduced from records of other species, even though closely related; in other words, each species and even each group of individuals of a species is a law unto itself."

Common Michigan birds, W. B. BARROWS (*East Lansing, Mich., 1911, pp. 35, figs. 8*).—A brief popular account.

Flowers and insects, their adaptation to one another and their mutual dependence, O. VON KIRCHNER (*Blumen und Insekten Ihre Anpassungen Aneinander und Ihre gegenseitige Abhängigkeit. Leipsic and Berlin, 1911, pp. IV+436, pls. 2, figs. 159; rev. in Science, n. ser., 34 (1911), No. 863, pp. 57, 58*).—This work consists of 16 chapters and an index.

Following the introduction, 2 chapters are given up to a discussion of pollination, the various ways in which it is brought about, and the peculiarities of insect pollination, or entomogamy. A chapter on the insects that visit flowers and their structural adaptations is followed by one on the general adaptation of flowers to insects. Chapters 6 to 13 are devoted to a discussion of the structure of flowers and the various types of entomogamy while the 3 concluding chapters deal with floral statistics, the causes of mutualistic adaptations of flowers and insects, and the various hypotheses which have been advanced to account for the phylogenetic origin and development of floral structures.

The review is by W. M. Wheeler.

Insect notes for 1910, O. A. JOHANNSEN (*Maine Sta. Bul. 187, pp. 24, pls. 8*).—This is a report of observations on the occurrence of and injury caused by insects in Maine during 1910.

Among the more important insects thus noted are the fall webworm, the saddled prominent (*Heterocampa guttivitta*), the birch leaf Bucculatrix (*Bucculatrix canadensisella*) as a leaf miner, parthenogenesis and pædogenesis in *Tanytarsus dissimilis*, the carrot rust fly (*Psila rosæ*) on parsnips, the fringed anthomyiia (*Phorbia fusciceps*), *Phormia regina*, *Amphicoma vulpina*, the alder borer (*Saperda obliqua*) infesting birch, the black vine weevil (*Otiorhynchus sulcatus*), *Aulax glechomæ*, *Torymus flavicoxa*, *Eurytoma gigantea*, the chinch bug, European elm scale, and several other scale insects.

Notes presented by Edith M. Patch on the Psyllidæ and Aphididæ include descriptions of 4 new species of the former, viz., *Psylla galeaformis* taken from the leaves of the alder (*Alnus incana*), *P. striata* from the tips of birch shoots, *Aphalara veaziei* swept from golden rod, sweet fern, grass, etc., and *Trioza obtusa* bred from nymphs developing on *Amelanchier canadensis*. Notes are also presented on *Mindarus abietinus*, the occurrence of *Chermes cooleyi* in New England, etc.

Cutworms, army worms, and grasshoppers, F. L. WASHBURN (*Minnesota Sta. Bul. 123, pp. 67–84, pl. 1, figs. 12, map 1*).—Brief illustrated accounts are given of cutworms, army worms, and grasshoppers, and of preventive and remedial measures therefor.

Insect enemies of tobacco in the United States, A. C. MORGAN (*U. S. Dept. Agr. Yearbook 1910, pp. 281–296, pl. 1, figs. 13*).—The article here presented, summarizing the data on insect enemies of tobacco and remedies, is in a measure supplementary to that by Dr. L. O. Howard on tobacco insects, previously noted (E. S. R., 11, p. 471).

Under the heading of insects of primary importance, the author considers the tobacco flea beetle, *Epitrix parvula;* cutworms; the tobacco hornworms, a more extensive account of which has been previously noted (E. S. R., 23, p. 465); the budworms, *Chloridea virescens* and *Heliothis obsoleta;* the tobacco splitworm, *Phthorimæa operculella;* the tobacco thrips, *Euthrips fuscus* (*nicotianæ*); the tobacco crambus, *Crambus caliginosellus* (?); and the cigarette beetle, *Lasioderma serricorne.*

The insects of secondary importance are discussed under the headings of insects attacking the seed bed, young transplanted plants, the foliage, the stem, the root and stem, cured and manufactured tobaccos, and tobacco seed, respectively.

Some insects and mites attacking the peach in Colorado, G. P. Weldon (*Colorado Sta. Bul. 169, pp. 3–13, pl. 1, figs. 2*).—The peach-twig borer (*Anarsia lineatella*) has been known in Colorado for a number of years, and while not a seriously injurious pest every season, there are seasons when it becomes exceedingly destructive and is responsible for a great financial loss to those peach growers who do not adopt proper methods of control.

The larvæ hibernate in little silk-lined chambers constructed within the bark and very close to its surface. They have been found by the author in Colorado almost entirely in the older crotches, and always, when found there, they have been in the brown portion of the bark just as close to its surface as the hibernacula could be constructed. Occasionally the hibernating cells containing larvæ have been found underneath buds on the new growth of peach trees, but their occurrence in this location does not seem to be at all general. The presence of the larvæ during the hibernating period can be detected by the tiny silken tubes, covered on the outside with bits of bark, which they construct at the entrance to their burrows. Frequent reference is made by the author to the bulletins on this insect by Marlatt, of the Bureau of Entomology of this Department (E. S. R., 10, p. 569), and by Clarke, of the California Station (E. S. R., 14, p. 590).

Although there was a scarcity of the twig borer in 1910, experiments conducted show that "Rex" lime and sulphur gave perfect results. "One tree sprayed with black leaf, 1:70, was free from wilted tips, and also 2 trees sprayed with black leaf '40,' 1:600. . . . Black leaf '40,' 1:600, apparently gave good results. . . . For some unknown reason, home-prepared lime and sulphur used at the same time as the 'Rex' spray, but in another orchard, apparently did little good." However, from experiments conducted in 1910 at Clifton, from the experience of many Colorado orchardists who have used lime and sulphur for the control of this pest, and from the apparent success of this spray in California, the author feels justified in recommending its use in sections of Colorado where there is injury from the twig borer. "While arsenate of lead was a total disappointment in this season's test, it has previously been used with good success and is no doubt effective when applied at the proper time."

The other insects briefly noted are the San José and Putnam scales, the peach-borer, the brown mite (*Bryobia pratensis*), and red spider (*Tetranychus bimaculatus*), previously noted (E. S. R., 23, p. 264).

Two plant lice of the peach, C. P. Gillette and G. P. Weldon (*Colorado Sta. Bul. 169, pp. 13–20, fig. 1*).—Accounts of the green peach aphis (*Myzus persicæ* and the black peach aphis (*Aphis persicæ-niger*) by the senior author have been previously noted (E. S. R., 20, p. 854).

The hibernation and spring, summer, and fall habits of the green peach aphis here described are followed by accounts of spraying experiments, the conclusions drawn from which are as follows: "Lime and sulphur, both 'Rex' and home-prepared, black leaf extract, black leaf '40,' and soluble oil, may be effectively used for the control of the green peach aphis when applied in the early spring, just as the eggs are hatching. A lime and sulphur spray is not effective when applied 2 weeks or more after the eggs are hatched, for at this time the stem-mothers are mature, or nearly so, and are able to resist the action of this insecticide. Good tobacco preparations may be used with success any time after the aphids hatch; but it is more difficult to succeed late in the spring, because it is then more difficult to get the spray on all the lice, on account of the protection of the leaves. The best time to spray for this insect is in the early spring when the eggs are hatching."

As yet the black peach aphis has not been of much economic importance in Colorado, although found from time to time in the peach-growing sections of the Western Slope.

Aphidiinæ of North America, A. B. GAHAN (*Maryland Sta. Bul. 152, pp. 147-200, figs. 11*).—This is a synopsis of the braconid subfamily Aphidiinæ, the species of which are parasites of plant lice. Ten genera are recognized as belonging to the subfamily of which those that occur in North America are represented as follows: Ephedrus, by 4 species; Monoctonus, 1 species; Praon, 9 species; Aphidius, 23 species; Lysiphlebus, 3 species; Diæretus, 4 species; and Trioxys, 3 species.

"The study of the types has been supplemented wherever possible by study of cotype and homotype material, as well as of large series of reared specimens of various species and some breeding work from known parents. The genera and species placed in synonymy have been so treated only after careful consideration and in the light of the knowledge gained of the range of variation from the study of extensive series of reared specimens from numerous hosts. Five new species are described, and in order to point out new characters, correct errors in former descriptions, obviate the confusion in certain cases resulting from the numerous descriptions of the same species under different names, as well as to bring the decriptions all together in a convenient form for reference, a redescription is included of all the established species of which authentic specimens could be obtained."

The species described as new, are *Ephedrus nigricornis* from Fort Collins, Colo., host unknown; *Aphidius gillettei*, reared from *Lachnus* sp. on *Abies lasiocarpa* at Fort Collins, Colo.; *A. juniperaphidis*, parasitic on *Lachnus* sp. on *Juniperus sibiricus*, at Boulder, Colo.; *Lysiphlebus flavidus*, parasitic on *Aphis albipes* at Fort Collins, Colo.; and *Trioxys coruscanigrans*, parasitic on *Macrosiphum frigida* at Fort Collins, Colo. Tables for the separation of the genera and species are included.

Catalogue of the Lepidoptera Phalænæ in the British Museum.—X, Catalogue of the Noctuidæ in the collection of the British Museum, G. F. HAMPSON (*London, 1910, vol. 10, pp. XIX+829, figs. 214; 1911, vol. 10, pls. 26; rev. in Nature* [*London*], *85* (*1911*), *No. 2156, p. 539*).—This volume is devoted to the Erastrianæ, the thirteenth of the subfamilies of the Noctuidæ recognized by the author. It contains descriptions of 1,222 species belonging to 136 genera, a considerable number both of the genera and species being described as new.

The fauna of British India, including Ceylon and Burma, edited by A. E. SHIPLEY and G. A. K. MARSHALL (*London, Calcutta, and Berlin, 1910, vol. 5, pp. XII+362, figs. 214; rev. in Nature* [*London*], *86* (*1911*), *No. 2165, p. 277*).—In this supplementary volume, extending from the family Lygæidæ to the family Corixidæ, the author describes a large number of species, completing his work on the Indian Heteroptera. It is announced that a further volume is to be issued, which will form an appendix to the Homoptera, will complete the enumeration of the Indian Rhynchota, with the exception of the families Psyllidæ, Aphididæ, Aleyrodidæ, and Coccidæ.

The wheat-head army-worm as a timothy pest (Meliana albilinea), R. L. WEBSTER (*Iowa Sta. Bul. 122, popular ed., pp. 3-7, figs. 5*).—This is a popular edition of Bulletin 122, previously noted (E. S. R., 25, p. 55).

Sugar cane borers in British Guiana, J. J. QUELCH (*Abs. in Agr. News* [*Barbados*], *10* (*1911*), *No. 236, p. 154*).—The giant moth borer (*Castnia licus*) and the smaller moth borer (*Diatraea saccharalis*) and their control are discussed in this interim report.

The fresh water fauna of Germany, K. GRÜNBERG (*Die Süsswasserfauna Deutschlands. Jena, 1910, vol. 2 A, pt. 1, pp. IV+312, figs. 348; rev. in Science,* *n. ser., 33 (1911), No. 851, p. 623*).—The first part of this volume takes up the Diptera that have aquatic larvæ, with the exception of the Chironomidæ, which will be treated in the second part. Synoptic tables to the genera and species and in many cases to the genera of the larvæ as far as known are included. Many of the genera and a number of the species taken up occur in this country.

The bean fly (Pegomya fusiceps), S. B. McCready (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), p. 43*).—Brief notes are given on the occurrence of this pest, together with suggestions for preventing attack.

Injuries to forests and forest products by roundheaded borers, J. L. Webb (*U. S. Dept. Agr. Yearbook 1910, pp. 341–358, pl. 1, figs. 11*).—In this paper the author treats briefly of 11 species of roundheaded borers.

"The western larch bark-borer, *Tetropium velutinum*, attacks perfectly healthy western larches, making winding, irregular galleries in the inner bark, thus cutting off the flow of sap and killing the trees. The methods of control are preventive. No attempt is made to save a tree which has once become badly infested. After becoming infested, trees should be felled and barked and the bark burned before the following May 15. A few healthy trees felled in May or June, near those infested, should attract the beetles which would otherwise deposit eggs in healthy trees. Before the following spring the bark should be stripped from these trap trees and burned."

The southern pine sawyer, *Monohammus titillator*, which is very destructive to felled pine timber in the Southern States has previously been considered (E. S. R., p. 260). An account of the locust borer, *Cyllene robiniæ*, has also previously been noted from another source (E. S. R., 18, p. 159).

"The painted hickory borer, *C. caryæ*, attacks dead and dying hickory, walnut, honey locust, mulberry, and Osage orange, the larval mines often riddling the sapwood and sometimes the heartwood as well. To prevent the spread of this species, all cutting of green timber should be done between August 10 and November 1. Timber which must be cut in spring or early summer should have the bark removed and the tops and useless branches burned.

"The black-horned pine-borer, *Callidium antennatum*, is an enemy of dead or dying cedar, juniper, pine, and spruce. Rustic work is especially liable to injury from this source. As a preventive against injuries by this species, cedar, juniper, pine, and spruce should be cut in late summer, fall, or early winter. If cut between January and August the trees should be barked when felled. In the case of injuries to rustic work, an injection of bisulphid of carbon and the plugging up of the holes with wax or putty is recommended.

"The cedar-tree borer, *Hylotrupes ligneus*, attacks dead and injured Douglas fir, arbor vitæ, red cedar, redwood, western hemlock, Engelmann spruce, juniper, alpine fir, giant arbor vitæ, white fir, big tree, and Arizona cypress. Like the black-horned pine-borer, it is injurious to rustic work. The usual preventive measures are recommended, i. e., removing the bark from trees when felled, or treating rustic work as recommended for the black-horned pine-borer."

The western cedar bark-borer, *H. amethystinus*, which has been found only in the Pacific Coast States, is of considerable economic importance in injuring the bark and wood of recently felled giant arbor vitæ and incense cedar. There is thought to be but one generation of this beetle per year and that adults emerge and deposit eggs in July, August, and September. The same recommendations for preventing injury as those given for the cedar-tree borer are applicable to this species.

The banded ash borer, *Neoclytus capræa*, is apparently the most destructive borer affecting ash, the larvæ perforating the sapwood with their mines and greatly depreciating its value, if not entirely ruining it. Besides ash, the borer attacks and lives in mesquite and, rarely, in white oak. The removal of the bark immediately upon felling or between March 1 and June 1 and the placing of the logs in water after the larvæ have hatched and before they have entered the wood are recommended as preventives.

The red-headed clytus, *Neoclytus erythrocephalus*, does considerable damage to the wood of dead and dying ash, as well as to a number of other trees. Its host plants include the hornbeam, hickory, maple, sweet gum, chestnut, cypress, hackberry, black walnut, dogwood, black oak, persimmon, peach, locust, sassafras, holly, mesquite, Texas redbud, pine, Kentucky coffee tree, lilac, honeysuckle, and grapevine. "The same preventive measures as those given for the banded ash borer apply to this species except, it will be noted, that the egg-laying period of this species is much longer than that of the banded ash borer, so that there is scarcely any season of the year when trees may be cut and left with bark on without danger of being damaged by this borer."

The work of the oak pruner, *Elaphidion villosum*, and the hickory twig-girdler, *Oncideres cingulata*, which is confined to the twigs and branches, is often quite injurious. When these species occur in injurious numbers, the fallen twigs and recently killed twigs of the trees should be gathered and burned in the fall in order to destroy the larvæ and pupæ in them. For the hickory twig girdler this should be repeated before vegetation starts in the spring and again during June or July.

The twig girdler (Oncideres cingulata and texana), C. E. Sanborn (*Oklahoma Sta. Bul. 91, pp. 13, figs. 7*).—The twig girdler, which is known to occur throughout the United States east and south of and including Kansas, subsists during its larval period on the wood of branches which have been girdled from the tree by the adult female. The adults begin to emerge about the first of August from branches girdled the previous fall. Within one or two weeks after emergence the sexes pair, and the females begin to girdle and generally, after completing the girdle, commence to oviposit in that part girdled from the tree. In rare instances, however, they oviposit at intervals in the branch while the process of girdling is under way. The branch is girdled entirely around or until it has become so weakened that it bends downward "One female can easily girdle all of the branches from 2 5-year-old trees or 5 3-year-old trees, or 15 or 20 2-year-old trees. The direct damage, therefore, caused by the girdling of select stock can easily be computed at about $10 per female beetle without taking into consideration the damage caused by the pernicious food habits of both sexes."

In Oklahoma oviposition commences about the first of September and continues until the time of heavy frosts late in the fall. "The number of eggs deposited by a single female varies from about 10 to 150. The greatest number I have found in a single girdled branch is 30. . . . The larvæ do not all hatch until late in winter. The egg generally hatches within about one week after it is deposited. The larva emerges from it at the end nearest the puncture, between which points there is a vacant space in which it first feeds by eating the soft tissue bordering the hard wood. As development proceeds it eats the hard wood cells in proximity to the water tubes leading from the leaf scars near the base of the bud or twig." Technical descriptions of the different stages accompany the account.

The author's observations prove conclusively that there is but one generation per year, the season of adult activity being from August until frost. Experiments conducted show that decaying wood is not suitable for the development of the larvæ, as previously supposed. They prove that the best conditions for the hatching of the eggs and the development of the larvæ is in twigs which do not fall to the ground but hang on the branches or trunk of the tree, thus protected from the soil moisture and natural enemies of the developing beetles.

The next best conditions are where the branches may fall on hard ground where they may be protected from moisture to some extent and consequent decay.

During the season of oviposition the females should be captured by hand in the infested orchards. Their presence can be told by the newly girdled twigs. "If the twigs are gathered and stored each year until about the first of July, then burned, all the twig girdlers contained in them will be destroyed, and meantime the egg parasites and probably some of the larval parasites will have escaped."

A bibliographical list of 18 references is appended.

Corn and cotton wireworm (Horistonotus curiatus), W. A. THOMAS (*South Carolina Sta. Bul. 155, pp. 3–10, pls. 7*).—This preliminary report is based upon investigations conducted in 1910 in cooperation with the Bureau of Entomology of this Department. In Colleton County, where the greatest loss occasioned by wireworms is found, an area of about 16 square miles is said to be infested.

The first complaints of injury by this pest were received in the fall of 1907. It appears to be a very general feeder, attacking practically all of the farm crops examined, including corn, cotton, cowpeas, oats, rye, peanuts, and tobacco. The injury to cowpeas is occasioned by the small worms cutting off the feeding roots as fast as they appear. The injured plant throws off numerous small rootlets along the affected root and these in turn are cut off by the worms. As the attack becomes more serious the plant ceases to grow and by the first of June the root system has become a roll of short stubby roots and thickly matted rootlets, clustering closely about the main stalk. The plants mature at about one-half the normal size and usually without making any grain. In many cases they are killed outright by the first attack.

The wireworms have not been observed boring into the stalk or roots of corn. Oats and rye seem to be attacked in the same way as corn, but the loss of roots does not seem to affect these plants so vitally. "Cotton and tobacco are also similarly affected. The tender feeding roots are clipped off, and the plants die of starvation. In tobacco this occurs soon after the plants are transplanted to the field and before they are thoroughly established in the soil. Very often the young cotton plants do not reach the surface of the soil before being killed by the wireworms. In peanuts the wireworms cut off many of the feeding roots, seriously checking the growth of the plant, and when the nuts are formed in fall these are bored into and the kernel destroyed. These worms have been found working in the fruit of peanuts as late as October 21."

The eggs are deposited in the spring and the larvæ hatching out feed through at least the two following summers, arriving at maturity in late spring or early summer. The adults appear to emerge late in the summer or fall and oviposit the following spring.

The most serious injury to corn appears to be caused from May 15 to June 1, that to cotton from the time it begins to come up until it has 3 or 4 leaves. In oats and rye the attack begins in the fall while the grain is very small and continues more or less throughout the winter and until it matures.

In view of the fact that the injury is confined to plants growing in light sandy soil decidedly deficient in humus, the remedial experiments conducted aimed at supplying humus to the soil and the stimulation of plant growth early in the spring. Experiments were conducted on 4 farms, a 5-acre tract on each being laid out into 10 plats and planted to corn. It was found on April 28 that on plats containing growing rye from the previous fall's sowing practically no worms were about the young corn plants, although thousands had collected about the growing rye and were rapidly destroying the root system. On plats without rye the corn was being badly attacked by the wireworms, about 40 per cent being seriously affected. On plats where stable manure and fertilizers were used the yield was at the rate of 43 bu. per acre; on plats where fertilizer alone was used the yield was at the rate of 9 bu. per acre; where rye alone was used the yield was 8 bu. per acre; and when no fertilizer or rye was used the yield was nothing.

The results indicate that the wireworms prefer feeding upon rye to feeding on corn, and that rye may be grown between the rows of corn as a trap crop until the corn has time to develop a root system sufficient to withstand their attack. It is thought that if the corn is stimulated in the early spring by the application of quick-acting fertilizers or by other means the plants will have developed a good root system before the worms can become destructive and a greater part of the injury thereby be avoided. As regards cotton, it is said that the only plat which gave a stand was the one that had been limed.

The mango weevil, C. L. Marlatt (*U. S. Dept. Agr., Bur. Ent. Circ. 141, pp. 3, figs. 2*).—This circular calls attention to the danger of introducing the mango weevil into this country in mango seeds, the shipments of which now arriving are largely infested with the pest. See also a previous note (E. S. R., 23, p. 764).

This weevil now inhabits all of the mango-growing regions on the Indian Ocean and adjacent islands and occurs throughout the East Indies, including the Philippines and other groups of South Pacific islands, and has also gained foothold in South Africa, Madagascar, and numerous other points. Van Dine reported (E. S R., 18, p. 355) that in Hawaii during the first year of an examination made for this pest 60 per cent of the mangoes were infested, and the following year 80 to 90 per cent, as many as 4 larvæ being found in a single seed in some instances.

The egg is deposited in the fleshy part of the fruit, and the young grub burrows at once into the seed pod and develops in the seed to a pupa and finally to the adult weevil. It remains in the seed for some time and can therefore be readily distributed with seed for planting or with the ripened fruit. The green mango soon heals up over the egg slit, and there is very little, if any, exterior indication of infestation. Protected as the weevil is within the seed pod, it is beyond the reach of insecticides and fumigation. The only means of determining its presence is by opening the seed pod and removing the paper like covering of the seed itself, when the work of the larvæ and weevil can be noted.

As preventive measures against the introduction of this insect the author recommends that all seeds for planting purposes be opened in this manner and where found infested burned, and that apparently sound seed be germinated in a box under a wire screen in order that any weevils which may occur in the seeds may be destroyed. It is urged that the State of Florida use whatever authority it may have to prevent or control importations of mango seeds.

Bee diseases in Ontario (*Ontario Dept. Agr. Bul. 190, 1911, pp. 11*).—This is a brief discussion of bee diseases, and their occurence in Ontario.

Bee keeping in Ontario, M. Pettit (*Ontario Dept. Agr. Bul. 191, 1911, pp. 3*).—A brief tabulated report on the honey prospects for 1911 in the various counties of Ontario.

The wheat jointworm, J. S. Houser (*Ohio Sta. Bul. 226, pp. 175–201, figs. 19*).—In this bulletin, which is based on observations made in 1908, 1909, and 1910, the author describes and illustrates the life history and habits of, and injury caused by, *Isosoma tritici*. This pest has been present in some sections of Ohio for the last 6 years, the infestation occasionally being so severe that the wheat has not been considered worth harvesting.

In all the observations made it was found that the covering leaf-sheath was pierced and the eggs deposited in the joints. In 1909 the joints high up in the straw were attacked, while in 1910 the lower ones were selected. It appears that the youngest joints are selected by instinct in order to allow the longest possible time for the development of the larva before the hardening of the straw. The author is of the opinion that the higher up the stalk is injured the less is the resulting damage that may be expected. While the larvæ sometimes occur singly, at other times as many as 25 will be found above a single joint, each in a single cell. Hibernation occurs in the closed larval cells, the insect being either in the larval or pupal stage. This affords an excellent opportunity for remedial measures. It is shown that moisture in the straw which contains the hibernating insects has much to do with the future of the pest. Adults forced to emerge by keeping stubble in a warm room were exposed for 19 hours on December 22 to a temperature that dropped to 10° F., without ill effect. Maps are given which indicate the localities in Ohio in which it was definitely ascertained that this pest occurred during the years 1908, 1909, and 1910.

Observations were made of the varieties of wheat affected. "Taken as a whole, the study of varieties, as pertains to the jointworm problem, indicates that one should select a wheat with a fair-sized, stiff straw, which is known to do well in his section. The stiffness prevents falling, and if the straw is fair-sized, it is believed that the presence of the jointworm larvæ within its walls does not injure it to the extent that it would if the straw were undersized."

Tests of the effect of fertilizers are reported in tabular form. A study made of the 3 tests described reveals no evidence as to whether or not fertilized or unfertilized wheat is more susceptible to jointworm attack under all conditions and during various seasons. The author concludes, however, that it pays to fertilize liberally as the increased yield more than offsets the harm produced by the greater percentage of infestation which may prevail.

As regards the time of seeding the author states that at present the only dependable recommendation to be made is that the wheat be sown on that date which with average conditions has been found to yield the best crop. He thinks that the danger from straw stacks has been unduly emphasized and that the danger from old stubble has been too little considered. His observations indicate that wheat adjoining stubble is more severely infested than that grown some distance away. It was found, however, that the jointworm adults will fly at least a quarter of a mile, and it is probable that under stress they will fly much farther. Of the several species of parasites *Ditropinotus aureoviridis* occurs in greatest numbers. The fungus *Sporotrichum globuliferum* was found during 1909 and 1910 to have destroyed great numbers of over-wintering pupæ.

The burning of the stubble of the year previous is considered by all odds the easiest and most effective measure to be used against the wheat jointworm, the other remedies to be employed being "nothing more than a thorough system of progressive farm practice."

The cotton red spider, E. L. WORSHAM (*Georgia Sta. Bul. 92, pp. 135–141, pls. 5*).—The author finds that in the latitude of Atlanta the red spider (*Tetranychus gloveri*) passes the winter in the adult stage and even propagates sparingly at a temperature slightly above freezing.

"Repeated examinations of a cotton field at Unadilla revealed the spider present throughout the winter on green vegetation in the field, on a ditch bank, and in a marsh adjoining the field. Some few blackberry leaves remained green all winter and furnished food for great numbers of adult spiders. The common goldenrod was another important winter food plant. In fact, all green vegetation about the field, with the exception of tough-leafed plants, such as bramble brier, were found to house small colonies of spiders. The hardiness of the spider is remarkable. In Atlanta violet leaves infested with the spiders were gathered in an ice-coated condition from open beds. When the ice thawed the spiders resumed their activities."

In experiments conducted at Unadilla during the winter it was found that in all cases where the spiders were isolated from food plants, but with otherwise normal surroundings, they all perished. "In several instances during the winter spiders were observed at the base of the plants, and even below the surface of the ground, but always on living plants. Such positions were occupied only temporarily and apparently on account of affording better protection from the cold.

"From breeding experiments conducted in the laboratory it was found that the female deposited from 1 to 12 eggs per day for a period of 6 to 10 days. Ninety-four eggs was the largest number noted as being deposited by any one female, 80 being the average in a large number of experiments. The eggs usually hatch in midsummer in 3 or 4 days, whereas at lower temperatures a week or 10 days and even longer periods of time were recorded. . .

"Some few eggs are deposited on the upper surface of badly infested leaves, but such cases are exceptions rather than the rule. The young at first have 6 legs, but after the first molt they have 8. They molt twice before they are fully grown. Usually from 9 to 14 days are consumed in reaching the adult stage. In all, 3 or 4 weeks cover the entire life cycle of individual spiders during the summer. In cotton fields the spiders seldom become numerous enough to attract attention until the first of July."

As a result of the removal of the juice from cotton leaves slight yellow spots appear on the surface which, as the feeding progresses and infestation becomes more severe, enlarge and the leaves begin to curl. Gradually the leaf turns reddish brown in color. Cotton thus attacked has a rusty red color in its final stage.

"Cotton and peas are by far the most seriously injured staple crops, and the spiders always discriminate in favor of them where a selection of food plants is to be had. . . . Of the greenhouse and ornamental plants attacked, violets perhaps rank first. Chrysanthemums, carnations, and the morning glory are close seconds. Roses are not so seriously affected. Violet beds housing over-winter adults were so badly infested by the middle of April as to present the appearance of having been scorched. . . . In vegetable gardens and on truck farms beans, tomatoes, cucumbers, and watermelons are attacked. The two former are very susceptible to red spider injury. At Unadilla, Ga., in the late summer beans and tomatoes were observed stripped of their foliage by the pests." No deciduous fruit trees were observed to be attacked even when readily accessible to the spiders and their more desirable food was scarce.

The lady beetle *Stethorus punctum* was the only natural enemy of this pest observed, both the larvæ and adult beetles feeding upon the spiders as well as their eggs.

"Of 14 sprays tested 3, viz, the lime-sulphur solution, Scalecide, and soap solution, gave very satisfactory results. The remaining sulphur compounds were more or less beneficial, but not to a degree to warrant recommendation. The lye solution and tobacco teas were practically worthless. The soap solution killed from 83 to 92 per cent of the spiders, but very few, if any, eggs. Both the lime-sulphur and Scalecide solutions gave admirable results, killing over 99 per cent of the spiders as well as the eggs. No injurious effect was apparent from any of the sprays."

Since the adult spiders pass the winter on green vegetation it is recommended that the winter food plants be destroyed by practicing fall plowing in infested areas. "Ditch banks should be thoroughly cleaned of green vegetation during the winter. The more nearly all winter food plants are destroyed in close proximity to infested cotton fields the more unlikely they will be to become infested the following year."

Studies on the biology of the Texas fever tick, H. W. GRAYBILL (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 130, pp. 7–42, tables 2, figs. 3*).—This bulletin is based upon studies conducted at Auburn, Ala., during 1907–8 in cooperation with the veterinary department of the Alabama Station.

Following a brief account of the history of biological studies of this tick, the author describes his methods of study. Under periods of the nonparasitic portion of development, studies of the preoviposition, oviposition, incubation, hatching, and longevity periods are reported upon. Then follow accounts of the number of eggs laid and precentage hatched, experiments with horizontal tubes, records obtained from the field plats, percentage of females ovipositing, effect of immersion in water on engorged females, the influence of moisture on the incubation period, periods in the parasitic portion of development, observations on the movement of ticks after the first and second molt, early distinguishing of females by males, experiments in transferring ticks on cattle, experiments on rearing unfertilized females, the occurrence of dead ticks on cattle, and the host relations of the cattle tick.

A bibliography of 22 titles is followed by an appendix consisting of 2 tables, the first on individual records of ticks used in the experiments and the second giving data on parasitic development of the ticks on animals.

Some of the more important ticks of the United States, W. D. HUNTER and F. C. BISHOPP (*U. S. Dept. Agr. Yearbook 1910, pp. 219–230, pls. 2*).—This paper gives brief accounts of 10 of the more important ticks that occur in this country.

FOODS—HUMAN NUTRITION.

[Experiments with wheat and flour], R. HARCOURT (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 81–98*).—In a study of Nos. 1 and 2 grades of northern wheat of the crop of 1910, in comparison with 1909 wheat, it was found that the water absorption in the new wheat was lower, "but that is only natural when new wheat is compared with old wheat that had been kept in a dry place for 12 months. In all other respects the flour from the new wheat is fully equal to that from the old wheat, and, when we consider the advantage due to aging of the latter, it is plainly evident that the miller has nothing to fear in milling the wheat of the 1910 crop."

From baking tests with a number of varieties of Ontario spring wheats, the author concludes that "without trying to give too much importance to these baking tests of one year's crop, it may be pointed out that Early Java gave the best all-around results, while French, Gatineau, Red and White Fife, White Russian, and Preston Springs gave results which compared wonderfully well with the Manitoba-grown Standard."

A large number of baking tests with Ontario-grown winter wheats of 1909–10 showed that there were some wide variations in the qualities of the wheats of the two seasons, the most notable point of difference being in the percentage of wet gluten, the amount being in general less in the 1910 crop than in wheats grown the preceding year. However, the author concludes that "although there is such a wide difference in some respects, the two crops are not very far apart in the quality of the bread they will produce."

The results obtained with carbon bisulphid, hydrocyanic-acid gas, and sulphur as mill fumigants are noted below from another source.

Some additional data are reported regarding the nature of a commercial substance recommended for fumigating flour mills. A chemical analysis showed that this material contained nicotine and other forms of alkaloids. There was no opportunity to determine its efficiency in destroying insects in mills, but the author was "unable to find that it did any injury to the flour. The strong smell of burning tobacco noticeable on the flour did not quickly disappear, and was evident in the bread made from heavily treated flour even 3 weeks after treatment. Otherwise the bread was in every respect equal to that made from the untreated flour."

Investigations on the effects of bleaching flour are also summarized and discussed. According to the author, the results obtained lead to the belief that "bleaching flour with the oxids of nitrogen produced by the electrical method whitens the flour and slightly improves the texture and appearance of the loaf. This difference is more pronounced with the flour from new wheat than with that from older wheat. The color obtained as a result of the treatment with the gas is whiter, but to many people it is not so desirable as the creamy tint of the normally aged flour. There does not appear to be much difference in the water absorption; in fact, in all our work we get rather lower absorption. The volume of the loaf is slightly increased, and, naturally, as the bleaching is a process of aging, the increase in volume is most noticeable in the flour from new wheat. To sum up, it would appear that bleaching has some of the effect of time in improving flour, but does not give the full results of 'aging' produced by time."

For earlier work see a previous note (E. S. R., 23, p. 368).

Effect of mill fumigants upon flour, R. Harcourt (*Northwest. Miller, 83 (1910), No. 11, pp. 661, 662, figs. 6*).—As a contribution to the question of mill fumigation for the destruction of insects the author carried on investigations on the influence of hydrocyanic acid, carbon bisulphid, and sulphur fumes upon the composition and baking quality of flour.

Treatment with hydrocyanic-acid gas, under the experimental conditions, did not destroy the bread-making quality, while treatment with carbon bisulphid and sulphur fumes resulted in darker loaves, poorer in texture and in general appearance. The author further concludes that treatment with hydrocyanic acid and carbon bisulphid vapor did not materially affect the production of alcohol-soluble or water-soluble proteids, but that in both hard and soft wheat flour the sulphur treatment materially increased the amount of water-soluble proteids. This was especially true of the soft-wheat flour. "The water-soluble proteids were also increased slightly by the carbon bisulphid treatment, both in the hard and soft flour, but more particularly in the latter. . . .

"The acidity of the flours was also influenced, more particularly, as would be expected, by the sulphur fumes, and possibly it is this factor, together with its effects on the gluten, which most seriously injures the sulphur-treated flour."

The effects of fumigants on the bacteriological life of flour were also studied, hydrocyanic acid showing no reduction in micro-organisms, carbon bisulphid a slight reduction, and sulphur-treated flour a great reduction.

"From the above results, it is very evident that carbon bisulphid would be very much more injurious to flour than hydrocyanic acid. The results were not continued long enough to ascertain how long the carbon-bisulphid-treated flour would be in getting back to normal condition, but the experiment was discontinued because it was felt that, if flour would not become normal in 4 or 5 months from time of treatment, it would practically be as fatal to the miller as if it never would regain its original condition.

"The carbon bisulphid is very effective in destroying insect life, but it is evident that, if this material is to be used as a fumigant, all wheat or flour must be removed from the mill before the fumigation is done."

The author points out that precautions must also be exercised in the use of the materials under consideration, owing to their poisonous properties.

A preliminary note on the nutritive value of white and of standard bread, L. Hill (*Brit. Med. Jour., 1911, No. 2627, pp. 1068, 1069*).—White and so-called "standard" bread were compared in tests with rats (2 lots of 25 each) fed exclusively on such breads or flour and water for 6 weeks. The total gain on white flour was 114 gm. and on standard flour (i. e., flour containing sufficient germ and bran products to make it represent 80 per cent of the original wheat berry) 278 gm. Ten of the rats fed white flour, originally included in the test, died, as compared with 5 fed on the standard flour bread.

The author states that he fed another lot on white flour plus an amount of wheat germ about equal to that in standard flour and obtained results as good as those with such flour.

When pancreatic digestion tests were made the standard flour gave the Adamkiewicz reaction for tryptophane earlier, "showing that this essential amino acid is split off earlier, and therefore is probably better absorbed in the intestine and utilized in the body."

Tests in which 15 individuals chewed a weighed quantity of 2 sorts of flour for 2 minutes did not show any differences in acidity.

According to the author, "it seems clear that either our standard flours contained something essential to growth which was not in our white flours, or that the white flours contained something detrimental—for example, improvers. . . .

"It is highly probable that the germ, the growing part of the wheat grain, would contain amino acid groupings essential for growth, and possibly bodies which activate the enzyms engaged in the digestion of the proteins of wheat. Treatment of the white flour may have destroyed these bodies. . . .

"It seems clear that children of the poor, who are largely fed on bread and margarine or bread and jam, ought to have the standard and not the white bread tested by us. How far the results are due to treatment of our white flours by 'bleaching,' etc., we are not able to say, and we can not therefore generalize that all white flours are worse than standard."

Comparative nutritive value of white and standard bread, E. S. Edie and G. C. E. Simpson (*Brit. Med. Jour., 1911, No. 2628, p. 1151*).—From tests with pigeons, which are briefly reported, the conclusion was reached that standard or whole meal bread is superior to white bread.

The results are discussed in connection with the work by L. Hill reported above.

Comparative nutritive value of white and standard bread, C. Watson (*Brit. Med. Jour., 1911, No. 2628, p. 1151*).—In a critical discussion of the paper by L. Hill, noted above, the author states that in experiments which he carried on with rats fed white and standard bread no appreciable differences could be observed which could be attributed to the kind of bread.

The bread supply of France, B. F. Yost (*Daily Cons. and Trade Rpts. [U. S.], 13 (1910), No. 146, pp. 1132–1134*).—Statistical and other data are summarized in this brief discussion of the subject.

The formation of albuminoses in meat products, Maurel and Arnaud (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 16, pp. 709–711*).—Analytical studies of pâtés and sausage showed that such goods often contained albuminose when fresh. This is probably in part at least derived from gelatin and is due to bacterial action. The data are discussed with reference to the matter of food poisoning.

Concerning fish flesh, C. ULRICH (*Arch. Pharm., 249 (1911), Nos. 1, pp. 68-80; 2, pp. 81-92; abs. in Chem. Zentbl., 1911, I, No. 14, p. 1073*).—The author reports the results of a large number of investigations on the effects of different methods of cooking and preserving fish with special reference to chemical composition and losses sustained.

In general, he concludes that there is much variation in the amount of edible material in fish, regardless of the method of preserving or cooking, the range noted being from 48 to 95.2 per cent. Those methods of handling fish are to be preferred which involve the least labor, as boiling, or those in which the fish is marketed ready for use, as smoking, pickling, salting, frying, marinating, and cooking in oil or in a jelly. When fish was boiled a loss was noted in all classes of nutrients. When baked, lean fish gained in fat content, owing to the added fat, and fried fish gained in nutritive value, owing to the flour or bread used in preparing it. Salting, pickling, smoking, and marinating all lessened the several nutrients in the fresh fish flesh. In general, the conclusion was reached that all methods of preparation lessened the amount of nutritive material originally present. The experimental data are discussed in detail.

Cheese and other substitutes for meat in the diet, C. F. LANGWORTHY (*U. S. Dept. Agr. Yearbook 1910, pp. 359-370*).—The possibility is discussed of using fish, eggs and milk, dried beans and other legumes, nuts and nut products, commercial meat substitutes, mushrooms and other edible fungi, and cheese, in place of meat, in suitable combination with other foods, in order that a palatable diet may be secured, special attention being paid to cheese and cheese dishes. The summary is based on extended investigations carried on in connection with the nutrition investigations of this Office.

On the blanching of vegetables (*Pure Products, 7 (1911), No. 6, pp. 318-320*).—A considerable amount of data is summarized regarding the relative losses sustained in steam-cooked vegetables in comparison with those cooked in hot water. See also a previous note by Maurel and Carcassagne (E. S. R., 22, p. 368).

[A new asparagus product] (*Pure Products, 7 (1911), No. 6, p. 320*).—A product designed for use in making asparagus soups and similar dishes is described, which is prepared by separating the soft pulp from the fiber of fresh asparagus and preserving it in cans in the form of a thick paste.

Studies of the more important legumes cultivated in Togo and German East Africa, C. GRIMME (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 9 pp. 547-553*).—Analyses of mungo beans, lablab beans, cowpeas, and other legumes are reported in comparison with earlier work.

The basic extractives of mushrooms, F. KUTSCHER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 9, pp. 535-540*).—Cholin and betain were identified. The chief basic material present was probably potassium. The results are discussed in relation to invalid dietetics. See also a previous note (E. S. R., 24, p. 665).

Pentosans in lower fungi, A. W. DOX and R. E. NEIDIG (*Jour. Biol. Chem., 9 (1911), No. 3-4, pp. 267-269*).—From studies with *Aspergillus niger* and 5 other common saprophytic molds, the conclusion was reached that pentosans "are normal constituents of the cell structure of lower fungi and are formed independently of the presence of pentose complexes in the culture medium."

The results also indicated that not more than traces of purins could have been present.

A comparative study of grapes from frozen and unfrozen vines, Hugues (*Ann. Falsif., 4 (1911), Nos. 30, pp. 175, 176; 31, p. 258*).—The data reported had to do particularly with the yield and character of grapes and the resulting wine from frozen and protected vines.

Dried grapes in Greece, L. Roos (*Ann. Falsif., 4 (1911), Nos. 29, pp. 113–126; 31, p. 258*).—A summary of data regarding the dried grape industry in Greece.

A study of the composition of Hawaiian pineapples, W. P. Kelley (*Jour. Indus. and Engin. Chem., 3 (1911), No. 6, pp. 403–405*).—The pineapples analyzed were found to vary considerably in composition, the sugar content ranging from 9.15 to 15.23 per cent; and the acidity from 0.22 to 1.16 per cent. and increasing generally as the sugar increased. On the whole Hawaiian pineapples show much the same average composition as those grown elsewhere.

"Green pineapples contain less acidity than the ripe fruit and also a small percentage of fiber, reducing sugar, and sucrose. Dextrin and starch do not occur in important quantities in pineapples at any stage. The reducing sugars and sucrose stand in inverse ratio to that of the ripe fruit. In the ripening of pineapples gathered green the most important chemical change that takes place is the conversion of reducing sugars into sucrose, but the total sugar content appears not to be increased.

"The cells of green pineapples as seen under the high-power microscope contain a thickened layer on the cell walls, which renders it difficult to express the juice from the cells. In the ripening process this layer gradually becomes dissolved away, until at maturity the cell walls are extremely thin and easily ruptured. With pineapples that are gathered green and allowed to ripen the thickened coat on the cell walls also becomes dissolved, thus apparently increasing the juice in the fruit but without materially changing its concentration.

"During the normal ripening of the pineapple a rapid accumulation of sugars and a slight increase in acidity takes place. When the fruit becomes approximately half ripe, it contains at least three-fourths of its maximum sugars."

Classification of ice cream and related frozen products—score card for ice cream judging, M. Mortensen (*Iowa Sta. Bul. 123, pp. 353–365, fig. 1*).—On the basis of a summary of data the author classifies ice creams as follows: (1) Plain ice creams; (2) nut ice creams; (3) fruit ice creams; (4) bisque ice creams; (5) parfaits; (6) mousses; (7) puddings; (8) aufaits; (9) lactos; and (10) ices. The last section is subdivided into sherbets, milk sherbets, frappes, punches, and souffles.

A number of formulas for making ice cream are given and a score card is proposed for judging the quality of ice cream.

The contamination of ice cream—a sanitary and bacteriological study, G. F. Buchan (*Jour. Hyg. [Cambridge], 10 (1910), No. 1, pp. 93–130, pl. 1*).—The author reports the results of a sanitary and bacteriological study of the ice cream industry in England, and of numerous investigations. The premises of 50 ice cream manufactories were inspected, their methods investigated, and bacteriological examinations made of samples taken immediately before heating the ice cream mixture, after cooling, and after freezing.

In general he did not find that the trade was carried on under conditions or with precautions necessary to insure a clean product. The bacteriological pollution of ice cream he considered is due to insufficient initial heating, or to contamination during cooling and freezing from "unclean vessels and covers, the addition of unclean ice to hasten freezing, the unclean hands of the manufacturer, and dirty surroundings."

Brief directions are given for the sanitary manufacture of ice cream, and bacteriological standards are suggested.

Cotton-seed oil as a food for man, H. W. Wiley (*Nat. Provisioner, 44 (1911), No. 23, pp. 28–33, figs. 12*).—The importance of cotton-seed oil as food for man is emphasized and suggestions made for increasing its use. The author regards it as a wholesome and valuable fat food.

Grain and malt coffee, Rubner and Kraus (*Vrtljschr. Gerichtl. Med. u. Öffentl. Sanitätsw., 3. ser., 40 (1910), No. 2, pp. 328, 329; abs. in Chem. Zentbl., 1910, II, No. 19, p. 1493*).—The data presented have to do with the adulteration or sophistication of coffee with glazed grain and malt coffee.

Preservatives in food, H. E. Davies (*Jour. Roy. Inst. Pub. Health, 19 (1911), No. 5, pp. 286–292*).—In this discussion of the question of preservatives the author summarizes some of his own work, particularly that which has to do with the detection of unusual preservatives, as sodium peroxid in milk and flourin compounds. He points out that in general an attempt is being made to use preservatives "which will evade the skill of the public analyst."

Inspection of imported food and drug products, R. E. Doolittle (*U. S. Dept. Agr. Yearbook 1910, pp. 201–212*).—Laws regarding imported food and drug products, their inspection by the Department of Agriculture, inspection procedure, and imported foods and drugs and their sophistication are the principal topics considered in this summary and discussion of the subject.

Report of the chemist, J. Hortvet (*Bien. Rpt. Minn. State Dairy and Food Comr., 13 (1909–10), pp. 197–261*).—Out of a total of 4,193 samples of canned fruits and vegetables, cheese, dairy products, alcoholic liquors, miscellaneous food products, and white lead and mixed paints which were examined, 2,013 samples were declared illegal.

The handling, transportation, and storage of perishable foodstuffs, J. S. Hepburn (*Jour. Franklin Inst., 171 (1911), No. 6, pp. 585–598, figs. 7*).—A digest of data, particularly relating to the work of the food research laboratory of the Bureau of Chemistry of this Department.

Wholesale prices, 1890 to March, 1910 (*U. S. Dept. Com. and Labor, Bur. Labor Bul. 87, pp. V+377–708, dgms. 4*).—A large amount of statistical data regarding prices of foods and other commodities is summarized, as well as information regarding the cost of living, earnings, and hours of labor in European countries. A paper entitled Wages and Hours of Labor of Union Carpenters in the United States and in English-Speaking Foreign Countries, by E. Stewart, is included, and a number of court decisions affecting labor are given.

Cost of living in Germany, 1907–8 (*U. S. Dept. Com. and Labor, Bur. Labor Bul. 88, pp. V+697–926+X*).—Statistical and other data regarding the cost of living of families of moderate income in Germany in 1907–8, and wages and hours of labor in Germany and Austria, are included in this bulletin, as well as a digest of recent reports of state bureaus of labor statistics and of recent foreign statistical publications, and also decisions of courts affecting labor.

Some observations on diet in India, B. N. Ghosh (*Jour. Roy. Inst. Pub. Health, 19 (1911), No. 5, pp. 293–299; Diet. and Hyg. Gaz., 27 (1911), No. 8, pp. 470–475*).—In connection with a critical discussion of studies of diet in India, particularly McCay's work (E. S. R., 25, p. 167), the author suggests dietaries for natives and for Europeans, and especially recommends the use of milk products in the native diet.

Some features of nutrition during growth, L. B. Mendel (*Jour. Home Econ., 3 (1911), No. 3, pp. 262–268*).—A summary and digest of data, with a general discussion of diet during infancy and childhood.

What to eat and why, G. C. Smith (*Philadelphia and London, 1911, pp. 310*).—Diet in relation to disease of various sorts is discussed in this volume, designed particularly for medical students and for practitioners. In addition to specific directions for arranging various diets, the author discusses such general questions as the composition of food, the principles underlying its use, and the scientific reasons why a change of diet is desirable in certain diseases and ways for arranging such special diets in a practical manner.

Good things to eat, R. Estes (*Chicago, 1911, pp. 142, pl. 1*).—A large number of recipes are given for soups, meat and fish dishes, vegetables, desserts, etc.

The book embodies the author's practical experience in connection with dining-car and restaurant cookery, and it is noticeable that many of the dishes can be prepared from such stores as might be part of the equipment of a dining car.

The successful home cook, Lucy H. Yates (*London [1910], pp. VIII+243*).—Many recipes are included for pastry and desserts as well as for meat dishes, though the bulk of the volume is devoted to a discussion of methods of preparing food and to the consideration of general housekeeping problems.

This book is written from the standpoint of English methods of housekeeping. However, the author's discussions of economy and other topics are of general application.

The respiration calorimeter and the results of experiments with it, C. F. Langworthy and R. D. Milner (*U. S. Dept. Agr. Yearbook 1910, pp. 307–318, pls. 2*).—The construction and operation of the respiration calorimeter in its improved form are described.

"As regards construction, the distinguishing feature of the apparatus is an air-tight and heat-tight metal-walled chamber, with outer insulating walls, which is of a size suitable for experiments with man. The chamber is equipped with conveniences so that the subject may remain in it for long periods if need be. Air circulation through the apparatus is provided for, the respiration products being removed and oxygen added as required. The respiratory products and other excretory products are measured and analyzed in comparison with the food supply, the oxygen consumption is determined, and also the total energy (i. e., heat) output of the body. With this apparatus it is therefore possible to study the complete balance of income and outgo of matter and energy in the body, to measure the respiratory quotient—that is, the ratio between oxygen consumption and carbon dioxid excretion—and to study other indexes of body change.

"Control tests have shown that even in experiments of long duration the measurements which are made are as accurate as those obtained in the analysis of small quantities of material by the usual laboratory methods. It seems fair to conclude that the respiration calorimeter is to be regarded as an instrument of precision, useful for the study of everyday problems as well as those of scientific interest."

See also a previous account (E. S. R., 24, p. 601).

A method for determining the total respiratory exchange in man, C. G. Douglas (*Jour. Physiol., 42 (1911), No. 4, pp. XVII, XVIII, dgm. 1*).—The author describes a mouthpiece and gas bag for collecting respiratory products, which may be worn by the subject, and designed for experiments of short duration. The advantages claimed are the lightness of the apparatus, its portability, ease of adjustment to the subject, and the fact that "the necessary manipulations can be done by the subject himself without external help. The method is equally adapted for determining the total respiratory exchange during rest and under conditions of even violent muscular work, such as running, and is particularly suitable for the examination of clinical cases."

The increase in metabolism due to the work of typewriting, T. M. Carpenter (*Jour. Biol. Chem., 9 (1911), No. 3–4, pp. 231–266*).—Continuing earlier work (E. S. R., 21, p. 568), respiration calorimeter experiments were made with 5 subjects, including both men and women.

According to the author's summary, during typewriting at the rate of 57 to 115 words per minute, there was an increase of pulse rate from 90 to about 120 and in respiration from 19 to 30, as well as an increase in body temperature. The work of typewriting resulted in an increase of from 30 to 70 per cent of the total metabolism, or, on an average, about 50 per cent above metabolism at rest.

"The amount of increased energy above the resting metabolism per 1,000 words was on the average about 7 calories and the increase in both the carbon dioxid and the oxygen was 2.5 gm.

"The increase in carbon dioxid and oxygen due to 1,000 strokes upon a typewriter was 0.57 and 0.54 gm., respectively, and about 1.6 calories increase in energy output.

"The measure of metabolism by periods during the work of typewriting shows that there was a gradual decrease in the amount of energy required per 1,000 strokes. This was more marked in the individuals whose hands and fingers became extremely tired, which would indicate that during fatigue, work is accomplished more economically.

"The average equivalent amount of work calculated from the increase in metabolism in these experiments varied from 1,950 to 4,600 kgm. per hour and the calculation based upon these results gave an average of 145 kgm. per 1,000 strokes of typewriting.

"The variation in the increase in metabolism due to the work of typewriting in these different individuals is considered to be due to differences in individual facility and technique. The female subjects showed a more uniform increase than the 2 male subjects who represented the extremes in these experiments."

Motion study—a method for increasing the efficiency of the workman, F. B. GILBRETH (*New York, 1911, pp. XXIII+116+32, figs. 44*).—In this discussion of efficiency in labor the author gives a description and general outline of motion study and considers at length variables of the worker, of the surroundings, and of the motion, and also the past, present, and future of motion study. Health, modes of living, nutrition, body size, training, and experience are among the variables of the worker which the author discusses.

As the author points out, "the aim of motion study is to find and perpetuate the scheme of perfection. There are three stages in this study: Discovering and classifying the best practice; deducing the laws; and applying the laws to standardize practice, either for the purpose of increasing output or decreasing hours of labor, or both."

R. T. Kent contributes an introduction to the volume.

Some observations upon the deep temperature of the human body at rest and after muscular exertion, N. D. BARDSWELL and J. E. CHAPMAN (*Brit. Med. Jour., 1911, No. 2628, pp. 1106–1110, dgm. 1*).—The temperature measurements were made with subjects at rest and walking and running for different distances and at different speeds. The recorded data show that in general there was a rise in temperature with normal individuals as a result of exercise. Though undertaken in connection especially with the subject of temperatures in tuberculosis, the work is of general interest.

Digestive leucocytosis after the ingestion of raw or cooked meat, P. LASSABLIÈRE and C. RICHET (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 15, pp. 637–639*).—The data reported and discussed were obtained in experiments with dogs and have to do with the increased number of leucocytes observed after eating meat and with the phenomena of alimentary anaphylaxis.

Digestion and assimilation of raw starch of different sorts in the normal and pathological digestive tract, L. FOFANOW (*Ztschr. Klin. Med., 72 (1911), No. 3-4, p. 257; abs. in Zentbl. Biochem. u. Biophys., 11 (1911), No. 13-14, pp. 556, 557*).—According to the author's conclusions, no differences were observed in the digestion and resorption of wheat, oat, and rice starch, 50 gm. being almost completely resorbed in the normal digestive tract. Raw potato starch was from 2.5 to 4 times less well digested, the digestion and resorption being particularly bad when the starch was taken in the form of isolated starch cells with their covering of cellulose.

Regarding the effects of various pathological conditions, it may be noted that the author concludes that in cases of fermentative dyspepsia raw starch of any sort is much less well digested than when taken baked or boiled. This was particularly true of the isolated potato starch cells.

Studies on water drinking.—V, Intestinal putrefaction during copious and moderate water drinking with meals, W. M. HATTREM and P. B. HAWK (*Arch. Int. Med., 7 (1911), No. 5, pp. 610-623*).—According to the experimental data reported, the drinking of copious amounts of water (1,000 cc.) and moderate amounts (500 cc.) decreased intestinal putrefaction, "as measured by the urinary indican output.

"Copious water drinking caused a more pronounced lessening of the putrefactive processes than did the moderate water drinking.

"In copious water drinking the total ethereal sulphate output was increased coincidently with the decrease in the indican output. This observation furnishes strong evidence in favor of the view that indican has an origin different from that of the other ethereal sulphates, and that they can not correctly be considered as indexes of the same metabolic process. . . .

"The decreased intestinal putrefaction brought about through the ingestion of moderate or copious quantities of water at mealtime is probably due to a diminution of the activity of indol-forming bacteria, following the accelerated absorption of the products of protein digestion and the passage of excessive amounts of strongly acid chyme into the intestine."

Data are also given regarding experimental methods.

Experiments on the relation of nitrogen to sulphur in metabolism, O. GROSS (*Ztschr. Expt. Path. u. Ther., 9 (1911), No. 1, pp. 171-189 dgms. 10*).—The effect of feeding lecithin was one of the questions considered in the extended investigations reported on the income and outgo of nitrogen and sulphur.

The metabolism of manganese and the law regarding manganese and iron minimum, G. M. PICCININI (*Arch. Farmacol. Sper. e Sci. Aff., 10 (1910), No. 9-10, pp. 419-436; abs. in Chem. Zentbl., 1911, I, No. 11, pp. 823, 824*).—Manganese is found in the human body and in the lower animals in small and variable quantities. It is derived from animal food and in smaller amounts from vegetable food.

When given to a dog per os manganese was resorbed from the digestive tract and stored in the liver, kidney, spleen, and intestinal wall. Manganese is excreted chiefly in gall and through the intestinal mucus membrane, and in much smaller quantity in the urine. The administration of manganese caused an increase in the iron content of the blood, liver, and spleen. Since manganese forms an integral constituent of the red blood corpuscles it is to be regarded as directly concerned in the formation of hematogen. Manganese regulates the absorption of iron and also the total assimilation.

A contribution to the etiology of beriberi, S. KAJIURA and O. ROSENHEIM (*Jour. Hyg. [Cambridge], 10 (1910), No. 1, pp. 49-55, pl. 1*).—The experiments reported on the relation of rice diet to beriberi were made with poultry.

The conclusion was reached that a disease very similar to beriberi can be produced by a diet of peeled rice, independently of climate or locality. "This fact seems to be of importance for the physiology and hygiene of nutrition, demonstrating the inefficiency of an exclusive rice diet to sustain life."

The experiments further led to the conclusion that the alcohol-soluble proteid of barley, at any rate in the quantities used, did not prevent the disease, and that the beneficial action of barley, when added to a rice diet, was due to some other constituent of this cereal.

"The addition to a rice diet of large quantities of calcium and of phosphorous (as calcium carbonate and calcium phosphate) seems also unable to prevent the disease."

Experiments with salts of aluminium and beryllium, W. J. Gies (*Jour. Pharmacol. and Expt. Ther., 2 (1911), No. 4, p. 403*).—A preliminary note on work reported below.

On the absorption of aluminium from aluminized food, M. Steel (*Amer. Jour. Physiol., 28 (1911), No. 2, pp. 94–102*).—When alum was administered in aluminum-free foods to dogs or when they were given biscuits baked with alum baking powder, "aluminum in comparatively large amounts promptly passed into the blood.

"Absorbed aluminum circulated freely, but as it did not show any pronounced tendency to accumulate in the blood, its full effects must have been registered outside of the circulation."

When aluminum chlorid was administered intravenously, from 5.55 to 11.11 per cent of the aluminum passed from the blood into the feces during the 3 days immediately following the injection. "Whether the aluminum passed directly through the walls of the intestine or was excreted by the liver, or whether both channels (or others) were followed, has not yet been ascertained."

Deterioration of aluminum and aluminum utensils, E. Heyn and O. Bauer (*Mitt. K. Materialprufungsamt Gross-Lichterfelde West, 29 (1911), No. 1, pp. 2–28; abs. in Chem. Zentbl., 1911, I, No. 12, p. 913*).—The results are reported of a chemical study of deterioration in aluminum utensils, in which the solubility in water and various solutions was especially studied. Treatment with vaseline diminishes the effect of tap water and similar solutions.

ANIMAL PRODUCTION.

Mendelism, R. C. Punnett (*New York, 1911, 3. ed., rev. and enl., pp. XIV+192, pls. 7, figs. 35*).—A new and enlarged edition of a lucid exposition of Mendel's law. The revision includes results of investigations since the previous edition was issued.

Computation of the coefficient of correlation, H. S. Jennings (*Amer. Nat., 45 (1911), No. 535, p. 413*).—A note which suggests an easy method for reducing the large product numbers resulting in the method proposed by Harris (E. S. R., 24, p. 375) in computing the coefficient of correlation.

On sex chromosomes in hermaphroditism, W. E. Castle (*Amer. Nat., 45 (1911), No. 535, pp. 425–430*).—The author makes use of the recent studies of Boveri[a] and Schleip[b] with parthenogenetic invertebrates to show how they provide a way of reconciling the opposed views that sex determination is independent of environmental influences and that it is dependent upon them, although he finds no positive evidence that environmental agencies control sex in the higher animals.

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[a] Verhandl. Phys. Med. Gesell. Würzburg, n. ser., 41 (1911), pp. 83–97.

[b] Ber. Naturf. Gesell. Freiburg, 19 (1911).

Germ-cell determinants and their significance, R. W. Hegner (*Amer. Nat., 45 (1911), No. 535, pp. 385–397, figs. 6*).—Pole disk granules are called germ cell determinants because only those cells which gather in the granules become germ cells. Several hypotheses concerning their origin and significance are suggested. "The attention of investigators ought to be directed toward the problem of discovering the origin and complete history of these bodies since their bearing upon the theories of heredity is of fundamental importance."

A bibliography is appended.

An experimental study of somatic modifications and their reappearance in the offspring, F. B. Sumner (*Arch. Entwickl. Mech. Organ., 30 (1910), pt. 2, pp. 317–348, pls. 3, figs. 11*).—The author submits further data on experiments with mice in support of the inheritance of somatic modifications (E. S. R., 22, p. 378).

The effect on breeding of the removal of the prostate gland or of the vesiculæ seminales, or of both; together with observations on the condition of the testes after such operations on white rats, G. Walker (*Johns Hopkins Hosp. Rpts., 16 (1911), pp. 223–255, pl. 1*).—The excision of the prostate glands, or of the seminal vesicles, or both, in white rats did not in all cases affect the structure of the testes. When both were removed they failed to breed, although spermatozoa were found, but when only one of the organs was removed they produced offspring, indicating that one organ could replace to some extent the function of the other. "Excision of the prostate did not have any effect on the structure or function of the seminal vesicles."

Studies in the experimental analysis of sex, G. Smith (*Quart. Jour. Micros. Sci. [London], n. ser., 55 (1910), No. 218, pp. 225–240, pl. 1; 56 (1911), No. 223, pp. 591–612*).—The author has continued the studies along the line previously noted (E. S. R., 23, p. 173). A case is also reported in which intestinal tuberculosis caused a degeneration of the reproductive organs of a cockerel, accompanied by atrophy of the sexual characters, but without approaching those of the female, which is in accord with the theory of sex-limited inheritance.

The injection of testes extract into hens was found to have an entirely negative effect on the increase of the comb in 8 out of 9 adult and young hens, when compared with the fluctuations in the growth observed in control birds. The injections had no observable effect on the health, body weight, fertility, blood properties, or other features, although large quantities were administered over periods varying from 15 to 75 days.

Inspection of commercial feed stuffs, P. H. Smith et al. (*Massachusetts Sta. Bul. 136, pp. 3–56*).—This contains results of feed inspection in 1910, with comments thereon. Analyses reported include cottonseed meal, linseed meal, gluten feed, dried brewers' grains, malt sprouts, distillers' dried grains, clover meal, alfalfa meal, wheat by-products, rye meal, bone meal, meat scraps, corn meal, hominy meal, oats, provender, fortified starchy feeds, corn bran, dried-beet pulp, clover and alfalfa meals, and proprietary mixed feeds.

Analyses of commercial feeding stuffs sold in Maryland (*Md. Agr. Col. Quart., 1911, No. 52, pp. 6*).—Analyses are reported of cottonseed and linseed meals, gluten feed, beet pulp, distillers' grains, meat meal, beef scrap, molasses feeds, and proprietary poultry and mixed feeds.

Concentrated commercial feeding stuffs (*Dept. Agr. Tenn. Buls. 1, 1910, pp. 88; 2, 1911, pp. 93*).—Analyses are reported of wheat by-products, corn bran, hominy feed, cottonseed meal, dried brewers' grains, malt sprouts, beef scrap, dried-beet pulp, alfalfa meal, linseed meal, chicken feeds, and proprietary mixed feeds.

[Analyses of cattle feeds], R. Harcourt (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 77–79*).—Analyses are reported of 74 samples of cattle feeds, including corn, wheat, oat, barley, and flax products, linseed cake, linseed meal, mixed feeds, pea meal, rice meal, molasses feeds, proprietary feeds, and silage. The requirements of the Commercial Feeding Stuffs Act, which came into force January 1, 1910, are noted.

Study of the conservation of olive residue, R. MARCILLE (*Bul. Dir. Agr. Com. et Colon, [Tunis], 14 (1910), No. 57, pp. 476–482*).—Experiments are reported with formalin, sulphurous acid, and other antiseptics to prevent fermentation and the growth of molds on the residue of the olive press when used for stock feed.

Feeding experiments, W. SCHNEIDEWIND, D. MEYER, and GRÖBLER (*Landw. Jahrb., 39 (1910), Ergänzungab. 3, pp. 161–195, 206, 207*).—In rations for swine containing steamed potatoes, barley, and fish meal the best gains were made with a high protein content in the early part and with a low protein content in the latter part of the feeding period. The average gain per head and day with a high protein content was 0.63 kg., at a cost of 0.5117 marks (about 8.8 cts. per pound); on a medium protein content, 0.64 kg., at a cost of 0.493 marks; and on a low protein content, 0.6 kg., at a cost of 0.509 marks. When soy beans were substituted for the fish meal the corresponding gain with a high protein content was 0.58 kg., at a cost of 0.5179 marks. The percentages of dressed weight for the 4 lots were 80.4, 81.2, and 79.4, respectively.

Beet chips were found to be much inferior to dried potatoes, and are not recommended in rations for swine. Other experiments with dried potatoes have been noted from another source (E. S. R., 21, p. 472).

Fattening cattle were found to do equally well whether tied in a common stall or when at liberty in a box stall.

Pine needles when made a part of the ration for wethers compared very unfavorably with bran or meadow hay.

The analyses of feeds used are given.

Fattening steers of different ages, J. W. WILSON (*South Dakota Sta. Bul. 125, pp. 60–72, figs. 6*).—This experiment was undertaken to ascertain the gains made by steers of the same quality, under the same conditions, and with the same kind of grain rations, but of different ages, and also to test the effect of age of steers on the production of pork with pigs following.

The cattle consisted of 2 lots each, 6 to the lot, of yearlings, 2-year-old, and 3-year-old steers. One lot of each age was home-bred and the other range-bred cattle. The feed, which was the same for each lot, consisted of upland prairie hay, shelled corn, and linseed meal. One-tenth as much linseed meal was given each lot as it would eat of shelled corn, and all the hay that was wanted. Enough pigs were put in each yard to pick up the waste. The tests lasted 127 days.

In the home-bred lots the 3-year-olds made an average daily gain of 2.52 lbs. and consumed 7.42 lbs. of corn, 5.81 lbs. of hay, and 0.73 lb. of linseed meal per pound of gain; the 2-year-olds averaged 2.39 lbs. gain daily and consumed 6.53 lbs. of corn, 5.8 lbs. of hay, and 0.64 lb. of linseed meal for each pound of gain; the yearlings made a daily gain of 2.48 lbs., and for each pound of gain they consumed 5.63 lbs. of corn, 4.32 lbs. of hay, and 0.55 lb. of linseed meal. In the range-bred lots the 3-year-olds made an average daily gain of 2.72 lbs. and required 8 lbs. of corn, 4.34 lbs. of hay, and 0.79 lb. of linseed meal per pound of gain; the 2-year-olds averaged 2.55 lbs. gain daily and consumed 7.8 lbs. of corn, 3.57 lbs. of hay, and 0.78 lb. of linseed meal for each pound of gain; the yearlings made a daily gain of 2.52 lbs. and for each pound of gain required 6.6 lbs. of corn, 2.7 lbs. of hay, and 0.66 lb. of linseed meal. Deducting the gain made by one 2-year-old steer, which was considerably below the average, the 3-year-olds made an average gain for the whole period of 333 lbs., the 2-year-olds 327 lbs., and the yearlings 318 lbs. There were 782 lbs. of pork produced following the 3-year-olds, 738 lbs. following the 2-year-olds, and 389 lbs. following the yearlings. Placing a value of 1 ct. a pound on concentrates and $8 a ton on hay, the average profit per head for the 3-year-olds was $16.46, for the 2-year-olds $12.85, and for the yearlings $13.20. This includes the pork produced but not the manure.

In shipping to market, a distance of 586 miles, the home-bred lots were fed sheaf oats and the range-bred lots prairie hay. The average losses per head for the lots fed sheaf oats were 3-year-olds 61 lbs., 2-year-olds 56 lbs., and yearlings 37 lbs.; for the lots fed prairie hay the average losses were 3-year-olds 53 lbs., 2-year-olds 49 lbs., and yearlings 39 lbs.

[Distillery slop for beef cattle] (*Breeder's Gaz., 59 (1911), No. 24, p. 1412*).—An account of the methods of feeding distillery slop as practiced in Kentucky, where about 50 per cent of the beef produced is made from distillery waste, although it is stated that the industry is diminishing because distillers obtain a better price for their slop when dried and shipped to Europe.

Cost of raising lambs, G. E. Day (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 135–137*).—In an experiment with 10 lambs dropped from March 1 to March 5 the average weight at 2 months was 55.2 lbs. and the cost of gain 6.85 cts. per pound. This includes all food consumed by the ewes during the whole year, and service fees, less value of wool, but does not include risk, interest, and labor. The rations of ewes and lambs from lambing consisted of oats, bran, oil cake, roots, and alfalfa. Five of the lambs in the above experiment were kept on pasture with no supplementary feed until October 15, when they were put upon feed consisting of oats, oil cake, bran, hay, and roots for 30 days, at which time the 5 lambs weighed 664 lbs. and had cost 4.58 cts. per pound. The average daily gain for the 5 lambs before going to pasture was 0.71 lb., on pasture 0 37 lb., and in pen on full feed 0.47 lb.

Experiments with swine, G. E. Day (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 138–141*).—The average cost per pig for raising 72 pigs to 11 weeks of age was $2.46. This includes service fees, maintenance of dry sows, and value of food consumed by sows and litters, but does not include risk, interest, labor, and manure.

Several experiments were conducted with 40 of these pigs to compare alfalfa, skim milk, and pasture, using corn meal as a check. In 90-day tests the meal alone produced an average daily gain per head of 1.07 lbs.; meal and alfalfa pasture, 1 lb.; meal and green alfalfa in pens, 1.13 lbs.; meal and skim milk in pens, 1.34 lbs.; meal, skim milk, and green alfalfa in pens, 1.36 lbs. In these tests 1 lb. of meal was equal to 4.3 lbs. green alfalfa or 6.79 lbs. skim milk. Valuing the pigs at $5 each, the skim milk at 20 cts. per 100 lbs., and the green alfalfa at $3 per ton, the price received per ton for meal with the hogs selling at 5 cts. per pound was $20.45, and at 8 cts. $53.

On the use of barley, barley feeds, and maize for fattening swine, H. Bock and D. Engberding (*Fühling's Landw. Ztg., 59 (1910), No. 24, pp. 841–858*).—Pigs about 7 months of age fed for a period of 49 days made an average daily gain per head of 0.711 kg. (1.56 lbs.) when maize and palm-nut cake were used as a supplement to potato flakes and skim milk, and 0.605 kg. when barley and an additional quantity of potato flakes were given as a supplement. There was but little difference in the percentage of dressed weight in the lots, or in the analytical constants of the fat, except that the melting point of the fat in the maize-fed lot was 2 per cent higher than that of the barley lot.

The development of the body of cattle from birth to the end of the growing period, W. Wagner (*Arb. Deut. Gesell. Züchtungsk., 1910, No. 8, pp. 162, tables 15, pls. 14*).—This contains data on the growth of cattle, determined chiefly by periodical measurements. In general during the first year the greatest increase was in height, and the second year in length and breadth. In the third year there was some increase in breadth and a considerable increase in flesh.

There are many references to the literature on the subject.

Beef raising in Canada, J. B. SPENCER (*Canada Dept. Agr., Branch Live Stock Comr. Bul. 13, pp. 112, pls. 25, figs. 22; U. S. Senate, Com. on Finance, 62. Cong. 1. Sess., 1911, pp. 118*).—A special report of all phases of the beef industry, made to the Canadian Minister of Agriculture and reprinted by order of the Committee on Finance, U. S. Senate.

Cattle in southern Rhodesia, R. WALLACE (*London, [1909], pp. 12, figs. 9*).—A description of the characteristics of the native Africander cattle and crosses with European breeds.

Outlines of modern sheep breeding, U. TELSCHOW (*Grundriss der neuzeitlichen Schafzucht. Hanover, 1911, pp. 232, pl. 1, figs. 82*).—This work treats of the anatomy and physiology of the sheep, the principles of breeding and feeding, and the common diseases of sheep. It is written from the natural history point of view, but so as to furnish information for the practical breeder.

Brood sows: Selection, feeding and management, C. CHRISTOPHER (*Arkansas Sta. Circ. 10, pp. 4*).—This circular contains information for the practical swine breeder.

Contribution to the knowledge of breeds of swine in the German Colonies of the South Seas, M. BAUSCHKE (*Arch. Naturgesch., 77 (1911), I, No. 1, pp. 1–32, pls. 3*).—A study of the origin and distribution of swine in the South Sea Islands.

From skeletal measurements the author comes to the conclusion that *Sus vittatus* was the principal species of swine, *S. niger* and *S. papuensis* being only superficially different from the modern representatives of *S. vittatus*. On the Bismarck Archipelago and the Caroline Islands they are found mostly in a feral condition while in the Mariana Islands a larger number are domesticated. Some swine there seem to be a cross between *S. vittatus* and the wild *S. scrofa*, and one breed is apparently a cross between *S. vittatus* and Roman swine.

A bibliography is appended.

Lard from wild and domestic Philippine hogs and the changes in the constants produced by feeding copra cake, H. D. GIBBS and F. AGCAOILI (*Philippine Jour. Sci., A. Chem. and Geol. Sci., 5 (1910), No. 1, pp. 33–43*).—Analytical constants are reported of lard obtained from the wild hog, native domestic hogs, and an imported Chinese breed.

"The variation in the constants of the lard of the Philippine wild hog from the normal lard values is seen to be rather slight and is chiefly noticeable in the low titer. The Koettstorfer number is slightly high. The iodin values, while about normal, are decidedly lower than the constants given by Lewkowitsch for the wild boar which was a native of the Temperate zone. . . . From the results of this work it is evident that lean hogs will deposit a body fat with constants considerably influenced by coconut oil, when copra cake forms only a part of the ration. When the ration is composed almost entirely of copra cake the influence upon the constants is more remarkable."

The fat of animals fed on cottonseed meal, J. SANARENS (*Ann. Falsif., 4 (1911), No. 28, pp. 72–75*).—This is a statement of the results of a chemical and physical analysis of the butter, body fat, and lard obtained from animals fed cottonseed products. The results show that cottonseed oil was present in practically all the animal products.

The Devon pack horse as an army horse, C. R. STAVELEY (*Jour. Roy. Agr. Soc. England, 71 (1910), pp. 79–90, pl. 1*).—A brief account of the origin and history of the pack horse, with suggestions as to how the breed may be restored because of its value for artillery, transport, and cavalry service.

Horse breeding in Germany, G. RAU (*Die deutschen Pferdezuchten. Stuttgart, 1911, pp. IX+89, pls. 26*).—A general account of the industry in Germany, and a study of noted individuals, with tables showing their ancestry.

Sex-limited inheritance and sexual dimorphism in poultry, H. D. GOODALE (*Science, n. ser., 33 (1911), No. 859, pp. 939, 940*).—An experiment in crossing brown Leghorns with buff Plymouth Rocks is reported, in which it appears that a recessive character sex limited in inheritance can be utilized in an explanation of the mode of inheritance of sexual dimorphism.

Interim report on the poultry industry in Germany, E. BROWN (*Jour. Nat. Poultry Organ. Soc., 5 (1911), No. 1, pp. 6–33*).—A statistical article, with special reference to the influence of the poultry industry in Germany on the supply of poultry products of the British markets.

Poultry experiments and management, T. I. MAIRS and H. W. JACKSON (*Pennsylvania Sta. Bul. 107, pp. 3–14, figs. 3*).—This contains information on hatching and raising chicks and on chick diseases, and reports feeding experiments.

The gains during the first 6 weeks with 4 different lots of chicks were as follows: A lot of 50 White Leghorns fed wet mash 3 times a day, in a yard which had been plowed and sown to oats and Dwarf Essex rape, made a gain of 42 lbs., and required 4.26 lbs. of feed to make a pound of growth in live weight. Sixteen Barred Rocks and 24 Rhode Island Reds fed a dry mash from a hopper, in a yard similar to the previous lot, made a gain of 50.75 lbs., and required 3.9 lbs. of feed for 1 lb. of gain. Fifty White Leghorns on a dry mash made a gain of 30.5 lbs., and required 4.54 lbs. of feed to make a pound of gain. Fifty White Leghorns fed a dry mash from a hopper, in a yard of sod composed of timothy, white and red clover, with some plantain and shepherd's purse, made a gain of 33.5 lbs., and required 4.25 lbs. for each pound of gain. As the chickens grew older less feed was required, which was probably due to the fact that there was a great amount of forage furnished by the yards, incident to the ripening of the oats.

Three lots of chicks were used for a crate-fattening experiment. A lot of 16 Grade Barred Rocks, thin in flesh, made a gain of 10.75 lbs. in 3 weeks, while in the same time 1 Barred Rock, 2 Rhode Island Reds, 4 White Wyandottes, and 9 White Leghorns made a gain of 8 lbs., and a lot of 24 White Leghorns and 1 Black Minorca gained 13 lbs. in live weight. "The gain in weight is but a small part of the benefit of crate fattening. The most important benefit is the improvement in the quality of the flesh, which unfortunately can not be directly expressed in figures."

Report of the professor of poultry husbandry, W. R. GRAHAM (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 156–161*).—Twenty-three pullets, from a pen of Barred Plymouth Rock hens selected for high egg production and the eggs of which had hatched well, produced in October 101 eggs and in November 337 eggs. Twenty-three pullets, reared under similar conditions from a pen of Barred Plymouth Rocks bred especially for shape and color, produced no eggs in October and 66 in November. The bred-to-lay pullets matured earlier.

The average cost per dozen of eggs from 138 pullets from October 1 to March 1 was 18.62 cts.; from March 1 to September 1, 8.48 cts. The average number of eggs per hen was 129.2. Valuing eggs at 3 cents each the average profit per hen over and above the cost of food, which was charged at market price, was 76.5 cts.

In a pen of fowls which received their animal food in the form of buttermilk, 55 per cent of the eggs hatched; where 10 per cent of the dry mash was beef scrap, 50.5 per cent hatched; where the hens had all the beef scrap they wanted in a hopper, 33 per cent hatched; where no animal food was given, 59.5 per cent hatched; where hens received about three-fourths lb. green cut bone daily, 40.5 per cent hatched. In a pen of 23 Barred Rock pullets, the best and strongest of a lot of 46, mated to 2 males, full brothers, bred from a hen the eggs of which had hatched well, 93.6 per cent of the eggs were fertile and 73.4 per cent hatched. In the pen consisting of the remaining 23 pullets of the above lot, mated to 2 cockerels bred from a hen the eggs of which had hatched rather poorly and the chicks had had a mortality of 40 per cent, 97 per cent of the eggs were fertile but only 39.7 per cent hatched.

Farm poultry, with the results of some experiments in poultry houses and fattening chickens, W. R. GRAHAM (*Ontario Dept. Agr. Bul. 189, 1911, pp. 64, figs. 46*).—This bulletin is intended to give information to farmers and others on general matters pertaining to the keeping of poultry. The subjects treated are the construction of poultry houses, egg production, feeds and feeding, incubation, rearing chickens, breeding fowls for market, for meat production, and for egg production, fattening chickens, dressing and shipping poultry, eggs for market, and breeds of poultry. The experimental data reported have been noted from other sources.

The effect of the present method of handling eggs on the industry and the product, M. E. PENNINGTON and H. C. PIERCE (*U. S. Dept. Agr. Yearbook 1910, pp. 461–476, pl. 1*).—This contains statistics on the production, storage, and consumption of eggs, with suggestions for improving methods of grading, packing, and shipping. It is pointed out that there is a great loss due to delays in marketing and bad methods of handling.

Data gathered from 20 shippers, from June to November, inclusive, showed that 4.36 per cent of the eggs received during that time were a total loss. There was a further partial loss for stale eggs, dirty eggs, and from other sources. Inquiry among country storekeepers in October showed that only about 25 per cent of the eggs of that month would rank as "firsts" on the Chicago market, 60 per cent as "seconds," due to long holding, 5 per cent cracked, and 4 per cent were rotten or stuck to the shells from long holding.

The sham Indian Runner duck (*Farm Poultry, 22 (1911), No. 7, p. 203*).—A note in support of the contention that the Indian Runner duck did not originate in India, but is a common breed in Holland, Belgium, and northern France, and native to that region.

The value of the shellfish industry and the protection of oysters from sewage contamination, G. W. STILES, Jr. (*U. S. Dept. Agr. Yearbook 1910, pp. 371–378, pls. 2*).—This contains statistics of the industry of growing and canning oysters. Other topics treated are methods of growing oysters, enemies of the oyster, and the pollution of oyster beds by means of sewage. See also a previous note (E. S. R., 25, p. 161).

DAIRY FARMING—DAIRYING.

[Report of] the professor of dairy husbandry, H. H. DEAN (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 106–131*).—Little variation was found in the fat and lactometer determinations of samples of milk taken from the top and bottom of weigh cans at intervals of from 2 minutes up to 10 or 12 minutes after dumping.

In pasteurizing cream containing an acidity of between 0.2 and 0.3 per cent an albuminous coating formed on the inside of the pasteurizer, causing considerable trouble and delay. This trouble was not noticed in cream containing over 0.3 per cent acidity, nor in cream that was separated at the factory and then pasteurized. No reason is assigned.

In similar lots of cream pasteurized on the day of delivery with an acidity of 0.335 per cent and the following day at an acidity of 0.535 per cent, there was practically no difference so far as pasteurizing, churning, or loss of fat was concerned. The flavor of the butter was apparently injured by holding the cream so long before pasteurizing and churning, but the other qualities in the butter—grain and texture, color and salting—were not affected.

In experiments to test the effect of a culture on similar cream, raw and pasteurized, the lots pasteurized, whether with or without culture, churned in less time and made better quality butter than did the raw cream lots. "In these experiments there was little difference in the fat lost in the buttermilk by churning raw cream or pasteurized lots."

Continuing the tests of the different breeds, incomplete records for the year show the average percentage of casein by breeds was Holstein 2.1, Ayrshire 2.48, and Jersey 2.55, and that of fat was Holstein 3.44, Ayrshire 3.97, and Jersey 4.49.

The average moisture content of 21 samples of curd from western Ontario cheeseries was 42.306 per cent; in 22 samples of green cheese, 34.664 per cent; in 11 samples of ripe cheese 34.638 per cent. The corresponding percentages of moisture in curd and cheese made at the college in 1910 were 49.282, 35.059, and 35.09.

A study of the effect of stirring curds at the time of dipping showed a tendency toward the development of more acid in the lots stirred. The moisture content was greater in the lots not stirred by 4.4 per cent in curds, 0.2 per cent in green cheese, and 0.48 per cent in ripe cheese. The average yield of cheese per 1,000 lbs. milk from the lots not stirred was 92.95 lbs., from the lots stirred, 92.05 lbs. The percentage of shrinkage during one month was 2.70 for the lots not stirred; for the lots stirred, 2.67. "The quality of the cheese was a little over one point better from the curds stirred." The conclusion is drawn that a medium amount of stirring of the curds at time of dipping will prove beneficial. However, as a result of 32 experiments along the same line, the conclusion is drawn that there is no advantage in giving the curds as much stirring at time of dipping as is the common practice.

In the work on relation of casein and fat in milk to the yield of cheese by months the highest percentages of fat and casein were in August, September, and October, due probably to advanced lactation in the cows. Many factors enter into the question of cheese making, such as skill of the cheese maker, losses of fat and casein in whey and during the process of making the cheese, amount of moisture left in the curd and cheese, length of time during which cheese is kept before selling, conditions of temperature, moisture, etc., in the ripening room, but on the average we shall not arrive at a more satisfactory basis of settlement with patrons than the fat-casein method. Milk containing an average of 3.862 per cent of fat and 2.652 per cent of casein produced 4.64 lbs. more cheese per 1,000 lbs. than milk containing an average of 3.527 per cent of fat and 2.442 per cent of casein The quality of cheese from the low-casein milk was slightly better than that from the high-casein milk.

The yield of cheese was slightly greater and the quality better using a coarse than with a fine curd knife due probably, it is stated, to the higher moisture content of the green and ripened cheese by using the coarse knife.

Normal milk produced an average of 2.58 lbs. more of higher moisture content and better quality cheese than similar milk (but with slightly higher percentages of fat and casein), overripe. The yield of cheese was 0.733 lb. per 1,000 lbs. milk more when the curds were dipped with an acidity of 0.17 per cent than with the lots dipped at 0.2 per cent acidity. The quality of cheese was practically the same in both instances.

The effect of acidity at the time of adding the rennet (setting) was tested in a series of experiments. While the results were not so pronounced as expected, it was found that the loss of fat in the whey was slightly less, the yield of cheese greater by a little over 1 lb. per 1,000 lbs. milk, and the quality of cheese slightly better in the normal lots than in the high-acid lots.

There was practically no difference noted in the use of 2 brands of rennet extract having an acidity of 0.8 per cent and 1.22 per cent, respectively.

The dairy herd, G. E. Day (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 133, 134*).—The record of the dairy herd for the past year is given. The averages for the herd of 31 cows are: Number of days milking, 276; pounds milk, 7,411; pounds fat, 274.65; cost of feed, $42.47; and profit, $26.19.

The Canadian record of performance for pure-bred dairy cattle, J. G. Rutherford (*Canada Dept. Agr., Branch Live Stock Comr. Rpt. 2, 1910, pp. 49*).—This contains the regulations, the standards for registration of the different breeds, and forms and records of cows qualified for registration.

Milk and butter tests at the Liverpool show, 1910, E. Mathews (*Jour. Roy. Agr. Soc. England, 71 (1910), pp. 213–223*).—This contains data on the yields of milk and butter of different breeds, and reports an experiment in coloring milk to illustrate the value of the tintometer in detecting the addition of coloring matter.

The dairy industry in the Netherlands, J. J. L. Van Ryn (*Dairy, 23 (1911), No. 270, pp. 154, 155*).—An abstract of a lecture before the British Dairymen's Association at The Hague, May, 1911. It gives a general and statistical account of the dairy industry of Holland, with special reference to the assistance rendered by the government and cooperative creameries.

The influence of feeds on milk production, A. Zaitschek (*Monatsh. Landw., 4 (1911), No. 6, pp. 169–178*).—A popular account of work previously noted (E. S. R., 25, p. 479).

Experiments in feeding diastasolin to calves, W. Müller and G. von Wendt (*Fühling's Landw. Ztg., 60 (1911), No. 2, pp. 41–46*).—Data are reported on feeding diastasolin. The average cost per kilogram of gain with 15 calves was 1.404 marks (about 15.2 cts. per pound).

Proceedings of the American Association of Medical Milk Commissions (*Proc. Amer. Assoc. Med. Milk Com., 4 (1910), pp. 266, pl. 1*).—This contains an article on the history, development, and statistics of milk charities in the United States, by J. W. Kerr, and other papers on dairy bacteriology and the production of sanitary milk by various authors.

Why do cream tests vary? Factors affecting richness of cream.—Relation of butter fat to butter, O. F. Hunziker (*Indiana Sta. Bul. 150, pp. 27–55, figs. 15*).—A series of experiments undertaken in order to demonstrate to the dairy farmer and creamery patron the effect of the different factors which cause variation in cream tests is reported.

In testing the effect of the richness of milk on the richness of cream, it was found that "all other conditions being the same 3 per cent milk produces 20 per cent cream, 4.5 per cent milk produces 30 per cent cream, and 6 per cent milk produces 40 per cent cream." Three series of experiments were carried out to illustrate the results of the rate of inflow, by which it was shown that the percentage of cream could be varied from 28.5 to 71.5. By varying the speed of the separator the percentage of cream was made to vary from 10 to 65.5. In studying the effect of temperature on the richness of cream, the average result at a temperature of 90 to 95° F. was 21.2 per cent fat, and at 50 to 60° 31.7 per cent. When the cream was separated at 50° the separator was sometimes clogged, causing the fat in the cream to run as low as 12 per cent.

Experiments were conducted to definitely show the effect on the richness of cream of the amount of water used to flush the bowl with the following results: When no water was used the average percentage of fat in the cream was 37.8; with water equal in amount to the capacity of the bowl, 37.3; with sufficient water to cause the cream discharged to appear watery, 35, and when twice the amount of water needed to produce a watery cream discharge was used the percentage of fat in the cream was 33.5 per cent.

Directions are given for calculating the amount of butter when the cream test is known and other matters relating to the separation and care of cream are discussed.

The grading of cream, B. D. WHITE (*U. S. Dept. Agr. Yearbook 1910, pp. 275–280*).—The author points out that much poor cream is received at the creameries because there is no incentive for the farmer to deliver good cream. The data obtained from creameries in Minnesota, Wisconsin, and Iowa show that the difference in price paid to patrons by the creameries is 2.07 cts. per pound of butter fat in favor of the creameries receiving sweet cream or whole milk. Besides paying on the basis of the quality of cream, a number of other suggestions are offered for improving the quality and grading the cream.

Cream cooling on the farm, M. COMANS (*Jour. Dept. Agr. Victoria, 9 (1911), No. 5, pp. 312, 313, fig. 1*).—A cooler and aerator, which was found to reduce the temperature of cream 22° as it came from the hand separator, is illustrated and described. It is thought that its use should improve the quality of the cream delivered to the milk factory.

Churnability of cream, W. F. COOPER (*Jour. Roy. Agr. Soc. London, 71 (1910), pp. 113–122, figs. 6*).—This is a preliminary report on the factors which affect the churnability of cream, which contains data on the number and size of globules of milk from different breeds. An apparatus for churning different creams simultaneously and for recording the length and number of strokes while churning is illustrated and described.

Investigations on the consistency of butter and butter fat, HESSE (*Molk. Ztg. [Hildesheim], 25 (1911), No. 42, pp. 788–790*).—A study of the factors which affect the texture of butter led to the conclusion that the chief factor was the nature of the fat in the ration, although the temperature at churning and the length of churning and working are of some effect.

The "Kingston" cheese; a cheese for small-holders and others, A. TODD and W. SADLER (*Jour. Bd. Agr. [London], 18 (1911), No. 3, pp. 193–203, fig. 1*).—A description is given of the method of making a new variety of cheese, weighing from 1 to 2 lbs. and fit for consumption 10 days after making, yet retaining the qualities of hard pressed cheeses of large size.

Studies on the bacterial flora of cheese, C. GORINI (*Atti R. Accad. Lincei. Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), II, No. 3, pp. 150–158, fig. 1; abs. in Centbl. Bakt. [etc.], 2. Abt., 29 (1911), No. 9–11, p. 229*).—In a study of cheese ripening the author finds that a liquefaction of gelatin is not a good criterion for determining whether or not a species of bacteria has proteolytic properties. He accordingly divides the proteolytic micrococci into two groups, *Micrococcus casei proteolyticus* I, which liquefies gelatin, and *M. casei proteolyticus* II, which does not liquefy gelatin. The importance of studying the power of these species to attack casein in an acid medium is pointed out.

Losses in making cheese from overripe milk, R. Harcourt (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 99, 100*).—In continuation of the work previously reported (E. S. R., 23, p. 386) experiments were conducted in such a way that it was possible to secure accurate weights of milk, whey, and cheese.

The average losses per 100 lbs. of milk in these experiments were, for normal milk, protein 0.803 lb., fat 0.529 lb., and moisture 3.11 lbs, 9.04 lbs. of cheese being recovered. The corresponding figures for overripe milk were protein 0.832 lb., fat 0.664 lb., and moisture 2.92 lbs., with 8.79 lbs. of cheese recovered. An experiment is reported which shows that the amount of protein lost is apparently dependent upon the amount of acid present and the length of time it is allowed to act in the curd.

[Losses in] dairy products, R. Harcourt (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 98, 99*).—In commenting on the value and cheapness of milk as a food attention is called to the large percentage of its value lost in making butter and cheese. In making butter very little but the fat of the milk is used; all the protein, sugar, and ash remains, and under present conditions usually goes back to the farm as feed for stock. In making cheese nearly half of the solids are lost in the whey, which, because of the ease with which it ferments, is only partly recovered as a hog feed. "If these milk solids could be put up in a solid form cheaply without decreasing their digestibility or flavor, a very valuable food would be added to those now available for human consumption."

The process of manufacture of a commercial casein product from whey by the use of sulphuric acid is described, and comments are made on the advisability of feeding hogs the whey residue on account of its free sulphuric acid content. It is stated that the acid condition can be easily overcome by the addition of lime, forming the harmless calcium sulphate. Feeding experiments are needed to ascertain the effect of the whey on hogs. Samples analyzed contained about 0.25 per cent fat and from 0.35 to 0.40 per cent protein.

Buttermilk cheese making at the creamery, J. L. Sammis (*Wisconsin Sta. Bul. 211, pp. 3-17, figs. 7*).—This is a more extended description of the preparation, packing and marketing, and food value of buttermilk cheese, previously noted (E. S. R., 23, p. 181).

The product may be shipped in butter tubs and retailed in paper pails or other small packages. It will keep for a week or 10 days at 50 or 60° F., but can be kept longer if stored at 32° or lower. Buttermilk from rich cream containing more than 50 per cent fat, or from cream which was pasteurized when very sour, is not suitable for making buttermilk cheese. "Buttermilk cheese has about the same food value, pound for pound, as lean beefsteak, which sells at twice the price." Improved methods of draining the curd in large quantities are described in detail, and directions are given for the construction and use of a draining rack for large creameries and of a floating strainer and siphon.

VETERINARY MEDICINE.

Antistreptococcic serum therapy in bovine pathology, L. Paris (*Rec. Méd. Vét., 88 (1911), No. 7, pp. 238-240*).—The author here details the very favorable results obtained with antistreptococcic serum for calves and foals and compares them with those obtained with other therapeutic measures.

The influence of subcutaneous injections of serum upon the opsonic index, O. Hartoch and N. Sirenskij (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 8 (1911), No. 5-6, pp. 602-610*).—The subcutaneous injection of a normal nonspecific serum into a guinea pig increases the phagocytic stimulating power of the guinea-pig serum. This is a specific stimulation.

Experimental chemotherapy of the spirilloses, P. EHRLICH and S. HATA (*Die Experimentelle Chemotherapie der Spirillosen. Berlin, 1910, pp. VIII+154, tables 3, pls. 5, charts 27*).—This book details experimental work in regard to the chemotherapy for recurrent fever and syphilis by S. Hata, a preliminary account of the action of dioxydiamidoarsenobenzol on *Spirochæta pertenuis* in the animal body by H. J. Nichols, clinical studies in regard to the chemotherapy of recurrent fever by J. Iversen, Bitter, and Dreyer, and numerous concluding notes on chemotherapy by P. Ehrlich.

In regard to the pathogenic action of the intracellular toxins of the Micrococcus melitensis, V. CAVACINI (*Ann. Ig. Sper., n. ser., 20 (1910), No. 2, pp. 179–197, pl. 1; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 12, pp. 1038, 1039*).—The author injected intraperitoneally, killed bouillon and agar cultures of *M. melitensis*, ascitic fluid, and goat serum into rabbits. The bouillon cultures, goat serum, and ascitic fluid had only a transitory effect on the animal organism and were never lethal, while the agar cultures produced acute and chronic forms of the disease and often resulted in death after a short time. By giving small doses of the killed bacilli from agar cultures, agglutinins and specific deviating substances were found in the blood. The serum in vitro was also bacteriolytic.

It was also possible to immunize rabbits in this way, but the serum obtained from such animals did not protect nonimmune animals.

Weber's reaction and Trichocephalus, J. GUIART and C. GARIN (*Semaine Med. [Paris], 29 (1909), No. 35, pp. 414, 415; abs. in Jour. Amer. Med. Assoc., 53 (1909), No. 14, p. 1139*).—The authors have found the Weber reaction or guaiac blood test to be positive in 13 cases in which the eggs of Trichocephalus were found in the stools, and eggs were never found without this positive reaction occurring sooner or later.

Report in regard to the activities of the division of animal hygiene of the Emperor Wilhelm Institute for Agriculture at Bromberg, MIESSNER (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3 (1910), No. 1, pp. 30–41; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 12, p. 1033*).—This is a short, scientific, and practical report of the work done during the fiscal years 1906 to 1909 in regard to the serodiagnosis of glanders, Tauruman and bovovaccination, aggressin test, and chemotherapeutic test for hemoglobinuria in bovines, etc.

The results of these tests are to be reported in some later scientific publication.

Annual report of the veterinary pathologist for the year 1909–10, R. E. MONTGOMERY (*Dept. Agr. Brit. East Africa Ann. Rpt. 1909–10, pp. 55–88*).—This report on the work of the year includes appendixes devoted to (1) the details of routine examinations at the laboratory, (2) East Coast fever, (3) coccidiosis, and (4) rinderpest.

Anthrax, C. F. DAWSON (*Delaware Sta. Bul. 90, pp. 3–61*).—A report of investigations in cooperation with the Bureau of Animal Industry of this Department.

After giving a brief account of the history of anthrax, variously known as splenic fever, malignant pustule, woolsorters' disease, charbon, and milzbrand, the author discusses the biology of the causative organism, the channels of infection, infection of the soil, the various forms and symptoms of the disease, anthrax in swine, birds, and man, microscopic diagnosis, post-mortem appearances, disposition of carcasses, susceptibility, and vaccination against the disease.

Under the last head, which includes a consideration of the several methods and vaccines thus far proposed for producing immunity, the author summarizes particularly his experience with the Pasteur method, the principal drawback to which seems to be the length of time required, which in the event of an outbreak is a serious disadvantage. With the idea of finding a method whereby an immediate immunity could be established in existing outbreaks, or whereby immunity could be produced under ordinary conditions in a shorter time than with the Pasteur treatment, the author conducted some experiments as a result of which he announces that he has produced an antibacterial serum by highly immunizing sheep by repeated inoculations, first of attenuated anthrax bacilli, and following these by inoculations of the most virulent races of the bacilli in increasing doses until the animal would withstand fifty thousand times the minimal lethal dose, with impunity. Such a serum will protect a sheep against an otherwise mortal dose of bacilli and produce an immediate immunity. . . . The serum will confer a passive immunity immediately, and thus protect the animal against fatal infection over the period which is necessary for the vaccine to confer an active immunity. Where an animal which has been protected by the serum becomes infected with an otherwise fatal bacillus, the results of this infection will be the production of a much stronger immunity than the vaccine and serum would confer.

Pyocyanase made after the method of Emmerich and Loew gave some good results when tested upon rabbits, but failed upon sheep. Anthraxin, which is made in a manner similar to mallein and tuberculin, was tested in regard to its efficacy with the result that it was not found to possess any immunizing properties. Some tests were also made with a commercial vaccine in pill form, but immunity could not be obtained with it.

"Anthraxase, prepared by the writer after the same general method used in producing pyocyanase, was without protective or curative properties, although it produced high fever when injected into rabbits and sheep subcutaneously."

Anthraxoin, consisting of a turbid suspension in carbolized normal salt solution of dead sporeless anthrax bacilli, was apparently useless in protecting sheep against anthrax when used similarly to the Pasteur vaccine.

A single vaccine, which had for its object the production of immunity in 2 weeks and thus cutting down the necessary period by 2 weeks, was made by the author by incubating a virulent bacillus for about 18 days at 42 to 43° C. " Such a culture, which will kill guinea pigs in about a week, thus holds a position between the two vaccines of Pasteur in strength. With it sheep were vaccinated and after 12 days withstood an otherwise fatal infection with virulent bacilli. That the immunity was not in all cases sufficiently strong was evidenced by the death now and then of a sheep when tested with virulent bacilli."

Along with the above investigations for studying the biology of the causative organism and the general sanitary aspects of the subject, it was decided to test the efficacy of freshly-prepared Pasteur vaccines, as it was believed that some of the bad results that have been reported as following the use of Pasteur vaccine were due to carelessness on the part of those preparing and using it. Vaccines 1 and 2, prepared by the author, were therefore submitted to practicing veterinarians of the State of Delaware to be used on receipt, the vaccine No. 2, however, not being shipped until 12 days after vaccine No. 1. The results of observations for 2 years indicated that the use of fresh vaccines from bacteria which had been incubated for from 4 to 5 days or until the bacteria sporulated is a good procedure to follow. The author believes that vaccine so prepared will remain active for several months.

The author "does not advise the abandonment of the old Pasteur system of vaccination against anthrax when it is practiced upon animals before they are turned out on the pastures in the spring of the year. When animals are dying, however, vaccination alone requires too long a period to protect, and it is in these outbreaks that the antianthrax serum should be used in conjunction with vaccine. The experiments have shown that a single vaccine may be used with good results. Where it is desired, however, the serum may be used simultaneously with the double vaccine of Pasteur."

Anthrax, with special reference to the production of immunity, C. F. Dawson (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 137, pp. 47*).—A reprint, with some rearrangement, of the above.

Comparative investigations of the value of the various biological methods for diagnosing glanders, M. Müller, W. Gaehtgens, and K. Aoki (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 8 (1911), No. 5–6, pp. 626–664, pl. 1, dgms. 7*).—The methods tested were the ophthalmic, cutaneous (mallein reactions), agglutination, precipitation, complement fixation, and the opsonic index with normal animals and animals infected per os.

According to the authors there is no single method which will with certainty detect glanders in all stages of the disease, but the best and most certain methods for nonclinical or occult cases are the malleinization of the skin and conjunctiva and the complement fixation test. The author prefers a combination of the 3 and their repeated use.

The opsonic index is considered of no value for veterinary police purposes.

Malta fever in domestic animals, C. Dubois (*Rev. Vet. [Toulouse], 36 (1911), Nos. 3, pp. 129–140; 4, pp. 199–212; 5, pp. 269–281*).—The first paper deals with the history, bacteriology, epidemiology, symptoms, and lesions; the second with the diagnosis, prognosis, etiology, and pathogeny; and the third with the treatment of this affection in domestic animals, its transmission to man, and prophylaxis.

Some observations on the transmission of Piroplasma bigeminum by ticks, A. Theiler (*Bul. Soc. Path. Exot., 2 (1909), No. 7, pp. 384, 385*).—The larvæ of *Rhipicephalus decoloratus* from females engorged on horses have been found to be capable of infecting cattle with *P. bigeminum*. It thus appears that this parasite can be hereditarily transmitted, not only from one generation of its tick host to another, but also to a third as has been shown to be the case with *Spirochæta duttoni* in *Ornithodoros moubata*.

Recurrent fever in Colombia, E. Robledo (*Bul. Soc. Path. Exot., 2 (1909), No. 3, pp. 117–120*).—The symptoms of the recurrent fever that occurs in Colombia are said to be similar to those of African tick fever. The parasite which resembles *Spirochæta duttoni* is transmitted by *Ornithodoros chinche* (*Argas americanus*). This tick is said to be very abundant in the warm sections of Colombia, particularly in abandoned houses, on herbage, straw, etc., and attacks the traveler with great avidity.

Critical remarks on trypanosome problems, S. Prowazek (*Arch. Schiffs u. Tropen Hyg., 13 (1909), No. 10, pp. 301–308, figs. 6; abs. in Sleeping Sickness Bur. [London] Bul. 7, 1909, p. 251*).—The author defines the genera Herpetomonas, Leptomonas, Crithidia, and Trypanosoma. The morphology and development of trypanosomes are discussed.

Note on a cattle trypanosomiasis of Portuguese East Africa, W. Jowett (*Jour. Compar. Path. and Ther., 23 (1910), No. 3, pp. 251–271, figs. 5*).—In this paper the author gives an account of the general morphological features, together with some animal reactions, of the trypanosome found in the neighborhood of Beira during an expedition to Portuguese East Africa.

Further note on a cattle trypanosomiasis of Portuguese East Africa, W. Jowett (*Jour. Compar. Path. and Ther., 24 (1911), No. 1, pp. 21–40, figs. 6*).—In this paper the author gives a more complete list of animal reactions of the trypanosome, and reports upon the effect of passing the trypanosome through a series of rats, fly transmission experiments, and the action of certain chemical agents on the trypanosome in vivo.

The results indicate that the trypanosome may be transmitted mechanically by one or other of the 2 genera of biting flies used in the experiment, namely Hæmatópota and Stomoxys.

The transmission of African horse sickness to the dog by feeding, L. E. W. Bevan (*Vet. Jour., 67 (1911), No. 433, pp. 402–408, figs. 2*).—The author here reports observations and experiments which led to the conclusion that dogs may become infected with African horse sickness in natural circumstances by feeding on infective meat.

Trypanblue in infectious anemia, A. W. Whitehouse (*Amer. Jour. Vet. Med., 6 (1911), No. 8, pp. 686–688*).—One of 3 cases of infectious anemia treated by the author with trypanblue recovered from the disease. In the case of the animal that recovered the treatment consisted of the administration of 3 grains of trypanblue dissolved in 200 cc. of sterilized cold water, the solution being raised to body temperature and injected at one application into the jugular vein.

Researches on trichinosis, M. Romanovitch (*Compt. Rend. Soc. Biol. [Paris], 70 (1911) Nos. 8, pp. 257–259; 9, pp. 339–341; 10, pp. 378, 379*).—This series of articles deals briefly with the experimental investigations of the action of *Trichinella spiralis* on the animal organism, its migration, and remedial measures. The investigations led the author to conclude that the fever, abscesses, and septicemia resulting in death as sometimes observed in human cases are due to the microbes inoculated by the trichinæ.

Experiments with the intradermal test for tuberculosis in cattle, A. R. Ward and G. S. Baker (*Amer. Vet. Rev., 38 (1910), No. 2, pp. 184–193*).—The authors summarize their work as follows:

"We have shown that 28 out of 30 reactions regarded by us as positive, proved positive on autopsy. Of 4 considered questionable 3 proved positive on slaughter. Two diagnosed as positive showed no lesions. Fifty-nine considered as nonreactors proved negative on autopsy. Seven classed as negative reactions showed lesions. The determination of a reaction calls for careful discriminating judgment on the part of the operator. With regard to the 7 cases of tuberculosis which we failed to recognize by the test, we prefer to attribute these to our inexperience rather than to a failure of the test. It is the only test so far known that is applicable to range cattle on the range. In comparing the subcutaneous and intradermal tests we find a remarkably close agreement in results. It requires no modification of the ordinary routine of the animals, except that in range cattle it is necessary to confine them while making the injection, and again 48 hours later to make the diagnosis. The time of this confinement is insignificant. The intradermal test applied 5 days after the subcutaneous test is not reliable."

The eradication of cattle tuberculosis in the District of Columbia, R. W. Hickman (*U. S. Dept. Agr. Yearbook 1910, pp. 231–242*).—This is a detailed account of the manner in which the work of eradication of cattle tuberculosis in the District of Columbia commenced November 29, 1910, was conducted, together with the findings and results obtained.

During the 4 months following that date 1,701 head were tested, of which 1,380 were apparently free from tuberculosis and 321 reacted and were slaughtered.

"In the post-mortem inspections of these carcasses, the correctness of the tuberculin reactions was verified in 98.36 per cent of the reactors, leaving only 1.64 per cent in which no tuberculous lesions were found. As an examination was not made of the deep-seated lymphatic glands and the interior of the joints, even this small percentage can not be positively classed as errors in diagnosis."

"Promptly following the removal of reacting cattle, the premises that had been occupied by them were thoroughly cleaned and disinfected under the supervision of a Bureau employee, a solution of bichlorid of mercury in water, 1:800, being used for this purpose and applied in the form of a spray by means of a strong force pump."

The work of retesting after the lapse of 6 months was started June 1, taking in order those herds from which reactors had been removed and slaughtered. "Of the 75 premises originally infected . . . , the number upon which a second infection was found was 13. Therefore the work so far accomplished has resulted in eradicating tuberculosis from 62 centers of infection. . . . More than one-half of the reactors on the retest were on 2 of the 13 premises. The percentage of premises showing a second infection is 17.33, and the percentage of reacting cattle on the retest is 4.47." At the time of writing (October 15, 1910) a second retest was under way.

The order of the Commissioners of the District for the suppression and prevention of tuberculosis in cattle, under which this work was conducted, is appended to the account.

Specific chronic enteritis of bovines; ophthalmic and cutaneous reaction with avian tuberculin, H. HOHNE (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 5, pp. 109, 110, fig. 1*).—A 14-day-old female calf was fed with the intestinal mucosa obtained from a cow affected with pseudotuberculosis of the intestinal tract. The feeding was repeated after 6 weeks with the mucus membrane from another animal. After the last feeding the calf remained apparently well, increased in weight, and was only affected a few times with diarrhea. Acid-fast bacilli could not be detected with any degree of certainty in the feces.

A year later the animal gave both an ophthalmic and cutaneous reaction with avian tuberculin, but not with tuberculins from other sources.

The histological changes of the liver of bovines in distomiasis, E. RAVENNA (*Clin. Vet. [Milan], Sez. Prat., 33 (1910), Nos. 26, pp. 409–416; 27, pp. 425–432; 28, pp. 441–450; 29, pp. 460–464; abs. in Deut. Tierärztl. Wchnschr., 19 (1911), No. 27, pp. 422, 423*).—This is a detailed account of studies conducted.

Lamziekte, W. ROBERTSON (*Jour. Compar. Path. and Ther., 23 (1910), No. 3, pp. 229–239, figs. 3*).—A detailed account of this disease. The author has isolated a bacillus which he thinks to be the causative organism of the disease. The use of the toxin obtained from a bouillon culture was of no value as a prophylactic agent. The author had some measure of success with cultures killed by heat, some 500 head of cattle being provisionally inoculated at the time of writing.

In regard to the quantitative determination of the antirennin content of milk by the rennet inhibition test, and also some remarks in regard to other hygienic milk tests, K. SCHERN (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 6, pp. 123–129, fig. 1*).—The author investigated the behavior of the catalase test with cow's milk, and determined that fresh milk from the same animal gave very different results on different days.

It is not believed that the findings with the catalase test can alone be relied upon for the diagnosis of mastitis. See also a previous note (E. S. R., 24, p. 218). The author also does not believe that the hemolytic method, as recommended by Bauer and Sassenhagen (E. S. R., 23, p. 114; 25, p. 290), will find universal application on account of the difficult technique involved and, furthermore, the cost of conducting the test.

The author finally points out the value of the acidity test (E. S. R., 24, p. 125) as a preliminary test and of the antirennet test (E. S. R., 21, p. 707) for detecting milk from diseased animals.

The treatment of milk fever, V. Vigadi (*Állatorvosi Lapok, 32 (1909), No. 51, pp. 623, 624; abs. in Berlin. Tierärztl. Wchnschr., 27 (1911), No. 9, p. 153*).—A number of cases are described which occurred among those animals which were pastured the longest.

The author wishes to emphasize that the disease is not restricted to debilitated animals or animals which have been kept under unhygienic conditions, but that it primarily stands in a close relation to gestation and parturition rather than to the breed and external factors. The author often utilized Schmidt's method without success, and with it in some instances the condition became worse. Only after the udders were washed out with pure water (and in another case, when a subcutaneous injection of strychnin was given) did the animals improve. In another case a lavage of the uterus followed by a rectal douche was performed with ultimate recovery. Milk fever can often be remedied without injecting the udder.

Report on experiments with the wild passion-flower vine in connection with the death of cattle in the Beaudesert District (Queensland), S. Dodd (*Jour. Compar. Path. and Ther., 23 (1910), No. 3, pp. 205–212*).—The author's experiments indicate that the white passion-flower vine (*Passiflora alba*), a native of Brazil, which has now become a naturalized weed in Queensland, was responsible for the illness and death among cattle near Beaudesert, where the investigations were made, and that it has been the cause of a great deal of sickness among the cattle of that district.

Combating calf dysentery and calf pneumonia, O. Schreiber (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 49, pp. 969–973; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 12, p. 1037*).—Aside from the usual prophylactic measures, the author sees salvation only in vaccination. Good results can be obtained with the serum and bacterial extract methods, as is shown by the work of the author.

A new nematode parasite of the ox (Onchocerca gutturosa n. sp.), L. G. Neumann (*Rev. Vet. [Toulouse], 35 (1910), No. 5, pp. 270–278, figs. 5; Jour. Trop. Vet. Sci., 6 (1911), No. 1, pp. 101–105, figs. 5*).—Nearly all adult cattle slaughtered at the abattoir at Constantine are said to harbor this parasite. It has been found in animals brought from more than 200 kilometers from Constantine, and is thought to occur throughout northern Algeria and Tunis. It especially affects the cervical ligament, chiefly at the internal surface of the layers in a more or less abundant connective tissue and particularly near the second and third dorsal vertebræ. It has occasionally been found in the intramuscular tissue of the thigh.

Gilruth's cyst in the gastric mucosa of bovines, E. Chatton (*Arch. Zool. Expt. et Gén., 5. ser., Notes et Rev., 5 (1910), No. 4, pp. CXIV–CXXIV, figs. 7; abs. in Bul. Inst. Pasteur, 8 (1910), No. 18, pp. 783, 784*).—This is a report of studies made of the protozoan parasite first discovered by Gilruth in Tasmania, a preliminary account of which has been previously noted (E. S. R., 23, p. 485). The name *Gastrocystis gilruthi* is proposed for it.

In regard to vaccinating animals against hog cholera, P. Uhlenhuth (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 13, pp. 220–223*).—A critical discussion in regard to Damman and Stedefeder's findings, accompanied by a few experiments to refute some of the statements made. (E. S. R., 24, p. 390.)

Our horses, their diseases and treatment, G. S. HEATLEY (*London, 1911, pp. XI+186*).—This is a practical guide.

Pernicious anemia of horses, P. SCHLATHÖLTER (*Über die perniziöse Anämie der Pferde. Inaug. Diss., Univ. Bern, 1910, pp. 58, pls. 2; abs. in Centbl. Bakt.* [*etc.*], *1. Abt. Ref., 49* (*1911*), *No. 5, pp. 133, 134*).—According to the author, pernicious anemia is caused by an ultrafilterable virus which is present in the blood and urine of horses affected either actively or latently. If either the urine or blood from infected animals is given per mouth (or on hay or straw), or is injected into the blood stream of normal animals, the disease is conveyed to these animals. Other domestic animals do not take the disease. The incubation period after artificial infection is as high as 3 months. Natural infection seems to have a still longer incubation period.

No effective treatment was found, but the author advises thorough prophylaxis.

Vaccination against equine influenza, VAETH (*Berlin. Tierärztl. Wchnschr., 26* (*1910*), *No. 5, pp. 110, 111*).—As a result of the author's work with numerous cases of this disease he believes the Gans serum to possess a protective action.

Toxic substances from Ascaris megalocephala.—Experimental investigations with the horse, M. WEINBERG and A. JULIEN (*Compt. Rend. Soc. Biol.* [*Paris*], *70* (*1911*), *No. 9, pp. 337–339; abs. in Rev. Vet.* [*Toulouse*], *36* (*1911*), *No. 5, pp. 287, 288*).—In the investigations here reported 39 horses were used. A clear sterile perienteric liquid obtained from *A. megalocephala* was instilled into the left eye of 34 horses and injected into the nasal cavity of the other 5.

The reactions obtained demonstrate that this ascarid secretes substances toxic to the horse. As none of the 16 horses which reacted were carriers of ascarids, and since 8 horses that were infested were found to be immune to the toxic action of the instilled liquid, the authors think that the horse becomes immune to the toxic substances secreted by this parasite.

In regard to fibrolysin, SPAETH (*Berlin. Tierärztl. Wchnschr., 27* (*1911*), *No. 9, pp. 148, 149*).—Fibrolysin did not show any curative or other effect with either a subcutaneous phlegmon or elephantiasis on the extremities of horses.

Elephants and their diseases, G. H. EVANS (*Rangoon, 1910, pp. XIV+343, pls. 28, figs. 36*).—This treatise on elephants is divided into 5 parts and 9 appendixes. Part 1 consists of a general account; part 2 is entitled Outlines of Anatomy and Physiology; part 3, Medicines and their Administration—Formulæ; part 4, Noninfective Diseases; and part 5, Infective Diseases.

The appendixes are devoted, respectively, to law cases, operations, age, growth increment, list of fodder plants, grasses, etc., eaten by elephants, breeding, case of impaction and rupture of the esophagus, surra, and a note on infectious diseases with special reference to anthrax.

Bacillary white diarrhea of young chicks, L. F. RETTGER and F. H. STONEBURN (*Connecticut Storrs Sta. Bul. 68, pp. 279–301, table 1, figs. 5*).—This is a report of studies conducted in 1910 in order to corroborate those previously reported (E. S. R., 22, p. 489). The information presented includes accounts of infection by the food supply, of the mother hen as the original source of infection, the presence of *Bacterium pullorum* in the yolks of fresh eggs, methods and results of testing fresh eggs, bacteriological examination of eggs incubated for varying lengths of time, symptoms and post-mortem appearances of the disease, and additional points of interest and practical suggestions.

The following is a summary of the information presented: "The original source of infection is the ovary of the mother hen. Eggs from infected hens contain the organism in the yolks. Chicks produced from infected eggs have the disease when hatched. The disease may be spread through the medium of infected food and water, hence normal chicks may acquire it by picking up infected droppings or food contaminated thereby. Infection from chick to chick can not, apparently, take place after they are three or four days of age. As a rule, infected chicks make less satisfactory growth than those that are apparently normal, and for some time they appear stunted and weak, but may eventually undergo more or less complete development. The female chicks which survive often harbor the infecton and may become bacillus carriers, infection in the breeding pens being perpetuated in this manner. In all probability infection does not pass from adult to adult. Infected hens are apparently poor layers, especially in their second and subsequent laying season."

A therapeutic agent for fowl diphtheria, J. Reidenbach (*Leipzig. Geflügel Ztg., 1910, No. 11; abs. in Berlin. Tierärztl. Wchnschr., 26 (1910), No. 5, p. 116*).—After trying numerous antiseptics against fowl diphtheria, among the number being 50 essential oils, the author concludes that ajowan oil possesses the strongest antiseptic action and is better than carbolic acid, formic acid, and formaldehyde. This oil is obtained from the fruit of *Ptychotis coptica*, an annual plant which resembles caraway and has for its habitat Egypt, Persia, and the East Indies.

Spirillosis of fowls and Argas persicus in Roumania, D. Mezincescu and J. Calinescu (*Bul. Soc. Path. Exot., 2 (1909), No. 6, pp. 292, 293*).—The authors have found fowl spirochetosis to occur in Roumania, and think that in that country it is the cause of a large part of the mortality among domestic fowls which has been reported to be due to fowl cholera.

Ducks and geese, as well as the common fowl and occasionally young turkeys, are attacked by the disease. *Argas persicus* has been found to be abundant in all poultry houses in which the disease has been observed to occur. The authors report a high mortality in naturally infected fowls but much lower in those artificially infected.

The filaria in the turkey's eye, M. Ozoux (*Compt. Rend. Soc. Biol. [Paris], 68 (1910), No. 20, pp. 974, 975*).—The author reports that a filaria, probably *Oxyspirura mansoni*, frequently occurs beneath the membrana nictitans of turkeys in all parts of the island of Réunion, as many as 8 having been found in one eye. None could be found in the blood.

A trematode parasite of the English sparrow in the United States, L. J. Cole (*Bul. Wis. Nat. Hist. Soc., n. ser., 9 (1911), No. 1–2, pp. 42–48, pls. 2; abs. in Science, n. ser., 33 (1911), No. 857, p. 853*).—The author has found young English sparrows at Madison, Wis., to be very commonly infected with the trematode parasite *Monostoma faba*. This parasite, which forms conspicuous cysts in the skin of the abdominal region, has long been known in Europe but has hitherto been reported in only 1 or 2 isolated cases on this continent. In the locality of Madison it appears to cause a certain mortality and it is thought possible that it may become one of the means which will help check the increase of the English sparrow. Unfortunately it attacks other small passerine birds of several families as well.

A bibliography of 7 titles is appended.

On a Halteridium and Leucocytozoon of the wood owl and their further development in mosquitoes, M. Mayer (*Arch. Protistenk., 21 (1911), No. 3, pp. 232–254, pls. 2*).—The author has found a Halteridium in the wood owl (*Syrnium aluco*), which develops in Culicidæ to flagellates (in *Culex annulatus* at room temperature and in *C. pipiens* and *Stegomyia calopus* at a lower temperature) for which the name *H. syrnia* is proposed.

"Beside a Leucocytozoon of the wood owl motile forms were found in the blood analogous to those described by Schaudinn; these have hitherto been observed only in association with it and certainly belong to its cycle. A partial further development of the Leucocytozoon in Schaudinn's sense was observed in *C. pipiens* and *S. calopus*, that is, the formation of large ookinetes and later of large slim flagellates which progressed like spirochetes. Schaudinn's work on alternation of generation and host in trypanosome and spirochete infection could thus in important points be confirmed."

RURAL ENGINEERING.

Progress and present status of the good roads movement in the United States, L. W. Page (*U. S. Dept. Agr. Yearbook 1910, pp. 265–274*).—This article briefly summarizes the history of road development in this country, and discusses the outlook for the future.

"The present trend of road affairs throughout the various States is toward a reform in administration and the adoption of a more progressive policy. The old system of paying road taxes in labor has proved inefficient and is being rapidly discarded for the better plan of requiring all road taxes to be paid in cash. It is also apparent that the State will ultimately be the unit of administration and will largely control and direct road work in the counties and townships. A reduction in the number of road officials is also inevitable, and knowledge and skill in road building will be required of each official."

Special road problems in the Southern States, D. H. Winslow (*U. S. Dept. Agr., Office Pub. Roads Circ. 95, pp. 15, figs. 13*).—This circular discusses a number of road problems encountered in the Southern States and suggests comparatively simple and inexpensive remedies available by the use of local materials and labor. These include methods of draining a flooded road by raising one side with logs, stones, or similar material; the construction of roadbeds, with a V-shaped foundation filled with rocks, brickbats, or sand to serve as a drain in swamp sections and low levels; and the protection from erosion of roads and ditches by the use of planks or trenches filled with logs.

Progress reports of experiments in dust prevention and road preservation, 1910 (*U. S. Dept. Agr., Office Pub. Roads Circ. 94, pp. 56*).—Experiments conducted during the summer of 1910 are reported, together with supplementary observations on experiments previously noted (E. S. R., 23, p. 489).

In the tests at Ithaca, N. Y., in cooperation with Cornell University for the purpose of ascertaining the relative value of different road binders under various conditions, their average total cost per sq. yd. was as follows: Penetration method, oil-asphalt 79.1 cts., refined asphaltic preparation 78.34 and 63.4 cts.; prepared-filler method, oil-asphalt 83.69 and 92.34 cts.; and mixing method, oil-asphalt $1.14 and $1.03, refined semiasphaltic oil $1.05 and 98 cts., and refined water-gas tar 93.37 and 90.87 cts.

Tests with tar and oil preparations at Knoxville, Tenn., showed a total cost per sq. yd. of 60.04 cts. for refined coal tar, 53.98 cts. for refined tar preparation, and 53.71 cts. for oil-asphalt. All the treatments appeared satisfactory when last inspected.

A 300-ft. section at Ames, Iowa, was surfaced with gravel and oil-asphalt at a total cost of 17.782 cts. per sq. yd. An oil-gravel-macadam treatment at Boise, Idaho, cost a total of 28.83 cts. per sq. yd.

In a continuation of the trials at Washington, D. C., concentrated waste sulphite liquor and semiasphaltic oil emulsion were used at costs ranging from 3.26 to 14.83 cts. per sq. yd. Somewhat better results were obtained from the materials when used alone, as the emulsion would, to a considerable extent, waterproof the road surface and prevent proper absorption of the sulphite liquor in later treatments. Treatments with oil-cement-concrete ranged in cost from $1.15 to $1.26 per sq. yd. with fluid residual petroleum, and from $1.21 to

$1.26 with cut-back petroleum residue. When no oil was used the cost was $1.13. At the time of the last inspection all sections were in excellent condition with no important differences apparent between them.

Oil-cement-concrete applications in New York City cost 89.33 cts. and 85.28 cts per sq. yd. using fluid residual petroleum, and $1.02 using cut-back petroleum residue, but the results are reported as being apparently less satsifactory than those in Washington. The division line between each day's work was evident, and the entire surface was rather rough and uneven. Bridge-floor surfaces were also constructed of these materials at Ridgewood, N. J., and when last inspected were found to be in good condition. The estimated cost was 46.08 cts. per sq. yd. using fluid residual petroleum, and 41.47 cts. using cut-back petroleum residue.

Brief supplementary notes are given on the condition of roads constructed in previous years at Youngstown, Ohio, Ithaca, N. Y., Newton, Mass., Independence, Garden City, Dodge City, Bucklin, and Ford, Kans., and at Bowling Green, Ky.

Bituminous dust preventives and road binders, P. Hubbard (*U. S. Dept. Agr. Yearbook 1910, pp. 297–306*).—The use of bitumens as dust preventives and road binders is discussed, and the preparation, classification, selection, and application of such materials are described. The following conclusions are drawn:

"Bituminous road binders may be employed in the construction of earth and gravel roads as well as macadam roads, but it is the latter type which, at the present time, gives promise of the most satisfactory results. The bituminous macadam, if properly constructed, seems well adapted to withstand the combined action of automobile and horse-drawn traffic. It is firm, resilient, and water-proof, and is dustless in the same sense that an ordinary asphalt pavement is dustless. Much depends upon the character of the bituminous binder used, and it is most necessary that this binder be subject to examination and certain specific tests, as in the case of cement, iron, steel, and other structural material."

[**Drainage work in Ontario**], W. H. Day (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 36 (1910), pp. 54–73, figs. 13*).—The progress of the drainage campaign in Ontario is discussed and a report given of the cement tile experiments under way at the college.

The view that underdrainage increases floods is considered unwarranted, and instances are cited wherein tile drainage has materially lessened spring freshets and soil erosion.

In tests of making drainage tile by hand in 1909, the total cost, including labor, of 1,000 hexagonal two-piece concrete 3-in. tile was found to be $10.64. Trials in 1910 with another machine showed a cost for the sand and cement for 1,000 tile ranging from $3.35 for a 7:1 mixture and 3-in. tile to $11.29 for a 4:1 mixture and 6-in. tile.

In 6 experiments to test the solubility of concrete tile, small samples were submerged in distilled water and in well water for considerable periods. No definite rate of solution could be established, but in all samples the rate appeared to fall off in distilled water, slowly in most cases, but very rapidly in a few, especially with clay tile. In well water the samples all behaved irregularly at first, giving either large losses or large gains, and these losses or gains subsequently fell off rapidly.

Experiments with larger pieces kept in running water for 10½ months showed a much lower rate of solution, and, on the basis of the work, it is believed there is no danger of concrete tile crumbling under ordinary conditions. The studies are to be continued.

Porosity was found to be increased with larger proportions of sand. "Because porosity is not essential, because it tends to increase the solubility, and because strength is a very desirable quality, we believe cement tile should be made in the proportion of 4:1 or stronger."

The danger of inexperienced men making tile of inferior quality is pointed out, and the necessity of discarding all such tile is emphasized.

Adobe as a building material for the plains, J. W. ADAMS (*Colorado Sta. Bul. 174, pp. 8, figs. 5*).—The advantages of adobe construction are discussed, directions given for the preparation and use of adobe as a building material, and descriptions presented of a cow barn, a henhouse, and a smokehouse or storeroom recently built with it at the Cheyenne Wells substation.

"An adobe house, properly built, will cost no more than a sod house and yet be as permanent, attractive, and comfortable as it is possible to build a house. They do not settle after they are dry. Mice do not work in them if they are protected at the foundation. They are superior to concrete or cement block houses in that they are nonconductors of heat and cold. They never sweat or become frosty on the inside, and rain does not wet the walls through as it does in many concrete houses. The labor required to build an adobe house is no more than that required to build a similar house of sod or concrete."

A homemade refrigerator (*Survey, 26 (1911), No. 12, p. 434*).—In an article quoted from the *Fresh Air Magazine* directions are given for a homemade device in which a bottle of milk may be kept cool by packing it in sawdust and for a similar device which requires only a small quantity of ice.

RURAL ECONOMICS.

An agricultural survey: Townships of Ithaca, Dryden, Danby, and Lansing, Tompkins County, New York, G. F. WARREN, K. C. LIVERMORE ET AL. (*New York Cornell Sta. Bul. 295, pp. 385–569, table 1, figs. 55*).—This bulletin is a summary of an exhaustive survey of the conditions that surround the business of farming and the people on farms in 4 townships of Tompkins County, N. Y., giving detailed statistics and pointing out the merits and defects of the various systems of the distribution of profits, capital, and expenses on the farm, the economic significance of the size of farms, distance from market, value per acre, labor, forms of tenure and their relation to crops grown and crops sold, soil, livestock, cattle and cattle products, systems of farming, age, and the increased earning capacity of educated farmers, together with suggestions for meeting some of the most important needs.

The relation of the size of farms to profits, receipts, expenses, and labor is illustrated by the following table:

Relation of the size of the farm to receipts, expenses, and labor—Farms operated by owners.

Acres.	Average size (acres).	Receipts per acre.	Labor cost per acre.[a]	Receipts minus labor per acre.	Other expenses and interest per acre.	Net profit per acre.[b]
30 or less	21	$26.14	$19.90	$6.24	$13.76	—$7.52
31–60	49	14.24	8.10	6.14	7 61	− 1.47
61–100	83	12.49	5.60	6.89	6.32	+ .57
101–150	124	11.56	4.54	7.02	6.13	+ .89
151–200	177	10.89	3.92	6.97	5.22	+ 1.75
Over 200	261	10.93	3.33	7.60	5.22	+ 2.38

[a] Total amount paid for labor, value of board of laborers, value of unpaid labor by members of the family, and the farmer's labor estimated at $326 for the year.

[b] Profit after deducting expenses, interest on capital at 5 per cent, and all labor as defined above.

The decreased cost of labor per acre on the large farm is attributed to the increased use of farm machinery, the value of which increases rapidly with the size of the farm, it being held that farm machinery on small farms costs nearly twice as much per acre as that on the larger farms that have nearly 3 times as much machinery. The most profitable general farms in the county contain from 200 to 300 acres of tillable land.

The question as to whether a farmer should rent or own land when he has only a limited amount of capital is discussed, and illustrated as follows:

Relative opportunities for men with small capital as tenants and as owners.

Capital.	Tenants.				Owners.			
	Number of farmers.	Labor incomes.			Number of farmers.	Labor incomes.		
		$601 to $1,000.	$1,001 to $1,500.	Over $1,500.		$601 to $1,000.	$1,001 to $1,500.	Over $1,500.
$1,000 or less	57	5	1	0	1	0	0	0
$1,001-2,000	58	8	0	0	35	0	0	0
$2,001-3,000	16	2	2	2	86	4	0	0
$3,001-4,000	1	0	0	0	114	11	0	0
$4,001-5,000	....	....	....	....	92	11	2	1
$5,001-6,000	1	0	0	0	91	18	8	3
Over 6,000	1	0	0	1	196	46	22	21

On a comparison of the 3 forms of tenure, cash rent, share of crops, and share of receipts, the tenant who paid cash rent made an average labor income of $604 and those who gave one-half of the receipts $342. The landlords who rented for cash made 5.2 per cent interest, while those who rented for one-half the receipts made 9 per cent. The farmers who operated their own farms made an average labor income of $423, as compared with $379 for the tenant farmers.

It is suggested that the 3 most important points for the improvement of agriculture in Tompkins County are larger farms, better cows, and a system of farming that combines stock with cash crops.

Rural economy in the Bombay Deccan, G. F. Keatinge (*Agr. Jour. India, 5 (1910), No. 4, pp. 302–318; 6 (1911), No. 2, pp. 114–123*).—The author discusses and illustrates the several systems of land tenure, the economic advantages of small holdings and irrigation wells, the disadvantages of the custom of tenants to live in villages, the serious drawbacks to the efficiency of labor, and the apparent high rate of interest, which ranges from 4 to 24 per cent for loans with land as security, and as much as 100 per cent for loans on personal security, this being attributed to the scarcity of capital, lack of organization, possibility of loss, trouble involved in collecting the interest, and the personal enmity which the village money lender often incurs.

First prize five-acre farm plan, A. Oppermann (*Missouri Bd. Agr. Mo. Bul., 8 (1910), No. 10, pp. 5–11, pl. 1*).—This bulletin contains the plan for buildings and grounds for the 5-acre farm awarded the first premium in what is known as the 5-acre farm contest conducted by the Missouri State Board of Immigration in June, 1910. A discussion shows in a plain and practical way how a man of limited capital may concentrate his energies on a small tract of land and make a reasonable good living for himself and family.

[Some farm problems], H. Wallace (*Ann. Rpt. Nebr. Bd. Agr., 1910, pp. 124–139*).—In this address before the Nebraska State Board of Agriculture the speaker discusses the following rural problems: Maintenance of soil fertility, farm labor, agricultural education, and a social organization of farm life.

The farmer and the consumer.—Can they be brought together? (*Country Gent., 76 (1911), No. 3044, p. 521*).—This article discusses and illustrates the relations between the laws of production and consumption, pointing out that production from the soil has never kept pace through a series of years with consumption, and showing that the low prices received by the farmer for his produce are not caused by overproduction but by underconsumption, due to the methods or system of present-day marketing. It is suggested that the producer and ultimate consumer could simplify the perplexities of marketing and lighten the burdens of each by simple and direct cooperation.

Credit cooperative societies in Russia and their intermediacy in joint purchases and sales, S. V. BOBODAEVSKI (*Ezheg. Dept. Zeml. [Russia], 29 (1908), pp. 280–300, pl. 1*).—In 1895 the Russian government established for the first time credit cooperative societies in which the members must be stockholders, but the financial operations of which are conducted with capital obtained from the Russian treasury, from private deposits, and from loans. By the law of 1904, the so-called loan and savings societies, private institutions which had been existing in Russia for several decades, were caused by the government to closely conform to the credit cooperative societies.

In 1909 there were in Russia 1,644 loan and savings societies and 3,133 credit cooperative societies, with about 2,000,000 members. Peasants form the majority of the membership. The financial statements of 902 loan and savings societies on January 1, 1907, and of 2,635 credit cooperative societies on January 1, 1909, show total resources amounting to 100,000,000 rubles ($51,000,000), and a total of loans advanced amounting to 84,000,000 rubles. These societies, in addition to advancing loans, gradually extend their operations in joint purchases of materials required by the members and in selling the articles produced by them.

Ameliorative credit in Russia, S. I. SLASTNIKOV (*Ezheg. Dept. Zeml. [Russia], 30 (1909), pp. 668–703*).—Credit organization by the Russian government for agricultural improvements had its beginning in 1896, but little progress was made until 1900, when new regulations were introduced which greatly stimulated the applications and granting of loans for various improvements. From 1901 to 1904, the allowing of credit gradually increased, but with the beginning of the Japanese War the appropriations for ameliorative credit were suspended until 1908, when the government again began to make appropriations for granting loans to peasants and farmers.

The loans allowed in 1908 and 1909 amounted to 1,915,464 rubles ($976,886.64). The interest charged is 3 per cent, except on loans for strengthening the shores of rivers, ravines, and quicksand when it is only 2 per cent. The kind of improvements and number of loans with amounts of capital allowed in 1909 were as follows: Drainage, 92 loans, 454,378.75 rubles; irrigation, 113 loans, 229,594 rubles; strengthening of soils, 11 loans, 10,962 rubles; forest planting, 2 loans, 3,056 rubles; orchards, 31 loans, 27,782 rubles; vineyards, 5 loans, 10,600 rubles; wine making, 1 loan, 3,500 rubles; grass sowing, 5 loans, 41,020 rubles; clearing of lands, 4 loans, 3,312 rubles; agricultural buildings, 20 loans, 55,554 rubles; agricultural establishments, 10 loans, 19,525 rubles; farming, 1 loan, 1,610 rubles; breeding cattle, 16 loans, 21,230.5 rubles; sundry improvements, 11 loans, 20,500 rubles; and butter-making cooperative societies, 96 loans, 117,875 rubles.

Supply and wages of farm labor, G. K. HOLMES (*U. S. Dept. Agr. Yearbook 1910, pp. 189–200*).—The author points out that the attractions of the city and the city's illusions of higher wages are robbing the farm of its laborers, showing that 83.1 per cent of the number of persons having gainful occupations in the United States in 1820 were engaged in agriculture, 44.1 per cent in 1880, and 35.3 per cent in 1900. It is shown that the introduction of farm machinery has increased the productiveness of labor and decreased the proportionate number of agricultural laborers. Especially is this true of the female element of agricultural labor for hire generally and negro labor in the South, it being held that more than one-half of the cotton is now raised by white labor. From 1855 to 1894 the time of human labor required to produce 1 bu. of corn on an average declined from 4 hours and 34 minutes to 41 minutes, and that of 1 bu. of wheat from 3 hours and 3 minutes in 1830 to 10 minutes in 1894.

The idea that agricultural labor is not paid as much in proportion to other labor seems to be controverted by the author, who points out that the money wages, together with the supplementary allowances and the lower cost of living of the farm laborer, in the end amount to more than he can earn in any occupation open to him in the city.

Farm labor from the city, H. H. Lyon (*Country Gent., 75 (1910), No. 3022, p. 1217*).—The author in discussing the possibility and advisability of getting farm labor from the city is doubtful whether such labor would be very satisfactory to the farmer should he get it, and whether it would remain long. He thinks it economically safer and possibly more profitable if the farmer would "cut down a little the amount of business he does," and depend largely upon himself and upon his country conditions to handle it.

Requirements and cost of animal power and motor power in agriculture, Strebel (*Fuhling's Landw. Ztg., 60 (1911), No. 11, pp. 361–377, fig. 1*).—This is a comprehensive discussion of the requirements and cost of animal power in agriculture and of the possibilities of substituting motor power instead.

The history of the agricultural tariff, H. Hertel (*Tidsskr. Landokonomi, 1911, Nos. 3, pp. 153–174; 4, pp. 255–270*).—This is a historical sketch of tariff legislation pertaining to agricultural production in European countries.

[Agricultural production in Spain from 1890 to 1910], D. E. de la Sotilla (*Bol. Agr. Tec. y Econ., 3 (1911), No. 27, pp. 264–275*).—Statistical tables are given, showing the acreage and average production and the total value of the principal agricultural products on dry and irrigated lands in Spain in the last decade of the nineteenth century and the first decade of the twentieth.

Foreign crops, June, 1911, C. M. Daugherty (*U. S. Dept. Agr., Bur. Statis. Circ. 20, pp. 13*).—This circular presents data as to the acreage, yield, imports, and exports of some of the principal agricultural products and the condition of growing crops in foreign countries in June, 1911.

AGRICULTURAL EDUCATION.

The origin of the Land-Grant Act of 1862 (the so-called Morrill Act) and some account of its author, Jonathan B. Turner, E. J. James (*Univ. Ill., Univ. Studies, 4 (1910), No. 1, pp. 139*).—In his main argument the author seeks to prove that Jonathan B. Turner, at one time professor in Illinois College at Jacksonville, Ill., was the real father of the so-called Morrill Act of July 2, 1862, and that he deserves the credit of having been the first to formulate clearly and definitely the plan of a national grant of land to each State in the Union for the promotion of education in agriculture and the mechanic arts, and of having inaugurated and continued to a successful issue the agitation that made possible the passage of the bill.

An appendix contains reprints of several documents considered in the case including a letter from Senator Morrill to Professor Turner, and a pamphlet on Industrial Universities for the People, published by Professor Turner. This pamphlet, published in 1853, outlines work for the proposed system of industrial universities along lines closely approaching the actual development in the land-grant institutions.

Agricultural experimentation and instruction in North America and Germany, K. VON RÜMKER (*Ztschr. Landw. Kammer Schlesien, 15 (1911), No. 20, pp, 618–621*).—In a comparison of agricultural experimentation and instruction in North America and Germany, the author reaches the following conclusions for Germany: (1) That the apportionment of higher educational institutions to two different authorities is not advantageous, (2) that a further clearer specilization in experimentation and instruction is necessary, (3) that the existing grading in agricultural instruction no longer fully meets the present needs of the agricultural youth, and above all that the special or technical training of the small farmer is insufficient, and (4) that the agricultural publication service is inadequate and gives too little consideration to small farming.

Agricultural schools, D. J. CROSBY (*Ann. Rpt. Comr. Agr. Vt., 2 (1910), pp. 165–173*).—This address includes a discussion of the present status of secondary instruction in agriculture in the United States, including types of schools teaching secondary agriculture, the function of agriculture in public high schools, and the functions of the special agricultural school. It is concluded that the influence of agricultural high schools is to stimulate rather than to retard the introduction of agriculture into public high school courses, and that they do not reduce the attendance at the colleges of agriculture.

Agricultural education in the common schools, E. HYATT (*Rpt. Cal. State Agr. Soc., 1910, pp. 41–43*).—The object of this paper is to call attention to and emphasize the fact that we must find something different from the traditional text-book method of approach if we would really get the genius of agriculture into the public schools. Two or three other methods of approach are mentioned. It is suggested that the best plan for a school to undertake agriculture is by finding ways to cooperate personally with the nearest agricultural industry, by actually entering into its spirit and its labors.

Transforming a country school, MABEL CARNEY (*Farmers Voice, 49 (1911), No. 121, pp. 10, 11, 19*).—This article describes how a teacher in a one-room country school in Illinois changed the physical surroundings of the school building, remodeled the course of study, and made the school a social center for the people of the community.

Community work in the rural high school, D. J. CROSBY and B. H. CROCHERON (*U. S. Dept. Agr. Yearbook 1910, pp. 177–188, pls. 4*).—Some influences that have a bearing upon the evolution of the rural high school are discussed, a general account of community work in such schools is given, the different forms of community work are outlined, and the details of such work as carried on in the Agricultural High School of Baltimore County, Md., are given. These have included meetings and courses of instruction for rural school teachers, adult farmers, and farmers' wives, and literary meetings, field days, and other exercises for children.

Cotton growing for rural schools, G. W. CARVER (*Alabama Tuskegee Sta. Bul. 20, pp. 5–29, figs. 8*).—Considerable information is here given relative to the preparation of the seed bed, fertilization, planting distance, and thinning, cultivation, grading and marketing, the American classification, diseases and insect enemies, products from a ton of cottonseed, how to collect an exhibit, and the various methods of cotton improvement.

Illustrated corn booklet, O. H. BENSON (*Jour. Ed. [Boston], 73 (1911), No. 20, pp. 543, 544*).—This article consists of suggestions and directions on the arrangement of a notebook on corn, as well as of the specific material that may be placed on each page. It is suggested at the close that in a general way this corn booklet plan may be used in developing the work in many farm and home subjects such as potatoes, poultry, bread making, home decorations, balanced rations, the model kitchen, crop rotation, etc.

The school garden, LANDMANN (*Gartenwelt, 15 (1911), No. 21, pp. 284–286, dgm. 1*).—The author gives suggestions for an ideal school garden, including a plan and description of a school garden adopted by the Realgymnasium at Biebrich on the Rhine.

Home vegetable gardening, C. S. HELLER (*Facts for Farmers [Mass. Agr. Col.], 1 (1911), No. 11, pp. 4*).—The facts here brought out have to do with the location of the home vegetable garden, its plan and arrangement, the location of crops, fertilizers, varieties of vegetables that have proved satisfactory under average home garden conditions, and a vegetable planting table adapted to northern conditions.

Farm demonstration work in North Carolina, C. R. HUDSON (*Prog. Farmer, 26 (1911), No. 26, pp. 580, 581*).—This article enumerates the purposes of the farm demonstration work in North Carolina and shows in detail what it has accomplished and what are the prospects for the future.

MISCELLANEOUS.

Yearbook of the Department of Agriculture, 1910 (*U. S. Dept. Agr. Yearbook 1910, pp. 711, pls. 49, figs. 31*).—This contains the report of the Secretary on the work of the Department during the year; 28 special articles abstracted elsewhere in this issue; and an appendix containing an article on the Publications of the U. S. Department of Agriculture and How They are Distributed, by J. A. Arnold; Review of Weather Conditions of the Year 1910, by P. C. Day; Seed Time and Harvest—Average Dates of Planting and Harvesting in the United States, by J. R. Covert; a directory of the Department, the agricultural colleges, the experiment stations, and State officials in charge of agriculture; and agricultural statistics in which the domestic production, prices, and commercial movement of the principal crops and farm animals have been presented with even greater fullness than heretofore.

Twenty-third Annual Report of Georgia Station, 1910 (*Georgia Sta. Rpt. 1910, pp. 167–175*).—This contains the organization list, reports by the president of the board of directors and by the director of the station on its work during the year, and a financial statement for the fiscal year ended June 30, 1910.

Annual report of the director for the fiscal year ending June 30, 1910 (*Delaware Sta. Bul. 92, pp. 8*).—This contains the organization list and the report of the director on the work of the station. It includes a financial statement for the fiscal year ended June 30, 1910.

Monthly Bulletin of the Department Library, April, May, and June, 1911 (*U. S. Dept. Agr., Library Mo. Bul., 2 (1911), Nos. 4, pp. 91–120; 5, pp. 121–158; 6, pp. 159–184*).—These numbers contain data for April, May, and June, 1911, respectively, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received.

Author index to Monthly Bulletin of the Department Library, volume 1 (*U. S. Dept. Agr., Library Mo. Bul., (1910), Author Index, pp. IV+341–426*).

NOTES.

Delaware College and Station.—W. C. Pelton has been appointed assistant horticulturist and M. O. Pence assistant agronomist, their work to be largely in connection with the extension division. Dr. C. F. Dawson, for several years professor of veterinary science and bacteriology in the college and veterinarian in the station, has resigned, this taking effect October 1.

At a Farmers' Day recently held at the college farm it was estimated that between 2,500 and 3,000 farmers were in attendance.

Massachusetts College and Station.—Plans have been completed for the new dairy building, for which an appropriation of $75,000 was made by the last legislature. This is to be a three-story fireproof structure, of dark red brick with granite foundations, with 60 feet frontage and 120 feet in depth.

The main floor will contain milk receiving rooms, washing and sterilizing apparatus, bottling and shipping rooms, refrigerators, an ice cream plant, and the separator, cream ripening, and churning rooms. On the second floor will be a dairy bacteriological laboratory, a milk testing laboratory, a laboratory for advanced students, and a dairy museum. A cheese room and a cheese ripening room, a laundry, an ice making plant, and a dairy machinery laboratory will be located in the basement. A unique feature of the building will be the observation corridors on each floor, by means of which visitors may watch operations going on in the different rooms without actually entering them.

Sumner C. Brooks, assistant in botany and vegetable pathology, has resigned, this taking effect September 15, and is succeeded by Edward A. Larrabee.

Ohio State University.—The students who took the course in agricultural education at the summer session have formed an association, known as the Ohio Association for the Advancement of Agricultural Education, which now has members in nearly every county in the State. One feature of the organization is a bureau of information, of which Prof. G. A. Bricker of the College of Agriculture is director, and the professors in charge of agricultural education in the other state institutions are members. The function of this bureau is to collect and publish information of value to members of the association.

Clemson College.—The *Farmers' Union Sun* for August 11 states that the trustees have authorized the organization of a work-boy course in agriculture. Into this class 20 students will be received at the opening of the coming session. They will be divided into two squads of 10 men each. One squad will work as laborers on the farm for a week, while the other squad will attend classes. At the end of each week, the squads will interchange and in that way alternate weeks will be devoted to farm work and to study. The course will be completed in two sessions. These boys will receive from 75 cents to $1 per day. A knowledge of reading, writing, and arithmetic is the only scholastic requirement for admission.

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EXPERIMENT STATION RECORD.

VOL. XXV. NOVEMBER, 1911. No. 7.

Two men have recently passed from the stage of action in Europe whose names are linked with the progress of agricultural experimentation—one an organizer and administrator, as well as a teacher, experimenter and writer; the other perhaps the foremost investigator in animal nutrition of his time, and likewise a teacher and writer of wide influence.

These men, Louis Grandeau, of France, and Oskar Kellner, of Germany, are known wherever the history and the results of agricultural investigation are known. Appreciated and honored at home by the State and by their colleagues, as also by the practical farmers, the influence of their work and their writings has extended far beyond the boundaries of their own countries. Both were directors of the first experiment stations established in their respective countries, Grandeau of the Experiment Station of the East, which was founded at his instigation at Nancy in 1868 as the first station in France, and Kellner, for the past eighteen years director of the famous Möckern Station, the forerunner of all the institutions of this class. Both men were likewise active in the editorial field, being the editors of the organs of the French and German experiment stations, respectively, and of popular journals relating to their work. And by a singular coincidence they died on the same day—September 22, 1911—Grandeau in Interlaken, where he was sojourning in the effort to recover his health, and Kellner at Karlsruhe, whence he had gone to preside at the annual meeting of the Association of German Experiment Stations.

The agricultural press of both countries have vied with one another in honoring the memory of these men, and in setting forth the exceptional and lasting character of their services; and for us in America, where their works were so widely known to readers of science, a brief review of their lives will serve to refresh the memory of their services and to record the appreciation in which they were held.

Louis Grandeau, professor of agriculture in the School of Arts and Trades in Paris, inspector general of experiment stations, and director of the Agricultural Station of the East, and sometimes referred to as the "grand old man of agricultural science in France," was born May 21, 1834, at Pont-à-Mousson, in the Department of Meurthe-et-Moselle, Lorraine. He was, therefore, in his seventy-eighth year at the time of his death.

After graduating from college he pursued graduate work for the doctorates in science and medicine and for the diploma of pharmacy. For ten years he worked under the direction of Sainte-Claire-Deville at the École normale supérieure, and under Claude Bernard at the College of France, where he did original research work on the presence of cæsium and rubidium in alkaline waters. He further gave attention to the alkaloids, methods of water analysis, and other lines of chemical study. At this period he became especially interested in organic chemistry and physiological studies, out of which grew his attention to the application of these branches in agriculture, and which furnished the basis and motive of his life work.

In 1867 he was sent to Germany by the French Ministry of Agriculture to study the experiment station system of that country. He was much impressed with the importance of the agricultural laboratories and experiment stations which had been established and with their practical value to agriculture, and he undertook the work of establishing such institutions throughout France.

On his return he laid his plans for the founding of a station before the Ministry of Agriculture, and received a grant which enabled him to open, in 1868, the Experiment Station of the East on his own estate, located near Nancy, as the first French station. In the same year he was appointed to the new chair of chemistry and physiology, as applied to agriculture, in the University of Nancy, and was invited to give a course of lectures on agricultural chemistry, an opportunity which, as he says, he accepted with enthusiasm in the hope that he might stimulate the improvement of agriculture in his native State.

During the first years of his work at Nancy he gave special attention to the physiology of plants and conducted special researches on the function of the organic matter of the soil in plant nutrition. In connection with these studies on soil humus, or *matière noire*, as he termed it, he devised a method for its determination which has remained in quite general use to the present time. With Fliche he investigated extensively the lack of tolerance of certain plants for lime, controverting the then widely accepted view of Thurman which attributed the distribution of the native floras to physical conditions of the soil. He also at this time began his observations on the influence of atmospheric electricity upon plant growth.

His studies of methods of analysis resulted in the publication of a volume on agricultural analysis (Traité d'analyse des matières agricoles) in 1877, which has passed through three editions, the last of which, a two-volume work, was published in 1897. This treatise was translated into German and Italian.

Grandeau had realized from the first that an experiment station needed not only a laboratory, but also experimental fields. His field work was conducted at the outset in part upon his own estate, and when the Mathieu de Dombasle School of Agriculture was established at Tomblaine near Nancy, he saw to it that such fields were provided. Here he carried on his cultural and fertilizer experiments for years, and when the station was transferred to the vicinity of Paris in 1890, he secured land for his field work at the Parc des Princes, in the immediate vicinity of the city.

Grandeau conducted an active campaign for the establishment of similar stations in various parts of the Republic, and was a large factor in this movement. In 1881 he was appointed inspector general of the stations, a position he held until the close of his life, which gave him a wider opportunity for the exercise of his influence. He established the *Annales de la Science Agronomique*, which was published under the auspices of the Ministry of Agriculture, as an organ of the agricultural stations and laboratories of France, for the dissemination of their detailed work, and for bringing to their notice the work of stations in other countries. He remained in active editorial management of this journal nearly to the close of his career.

Grandeau was an earnest advocate of the demonstration fields, which early became a feature of the campaign for the improvement of agriculture, and urged their establishment and extension throughout the Republic. These fields, of which there are more than three thousand, were designed to bring the results and applications of the teachings of the stations to the attention of farmers by ocular demonstrations on small areas. On one occasion he said in advocating them: "If every town of France could have a demonstration field, the agricultural aspect of the country would be changed in a few years and the primary benefit to the peasant would redound to the benefit of the country as a whole." These fields are ranked among the most powerful agencies for increasing and improving agricultural production in that country.

In 1872 one of the omnibus companies of Paris decided to establish a laboratory for the purpose of carrying on experimental work with reference to the rational feeding of horses, and Grandeau was intrusted with the task of organizing this laboratory and directing its work. His activities in that direction continued through many years, and led to a wider interest in both human and animal nutrition, to which subjects he gave much attention during the last years of his life. In 1905 he summarized the results of twenty years' investigation with work horses, giving practical deductions as well as theoretical conclusions.

As a teacher Grandeau's influence was exerted both in the classroom and through the press. At the age of twenty-five he was professor of chemistry for the Philotechnic Association, which gave free instruction to the workmen of Paris. For twenty years he was professor on the faculty of sciences at the University of Nancy, which conferred upon him the office of dean. During this period he was also professor of agriculture at the National School of Forestry. When he left Nancy to locate in Paris he was called to the chair of agriculture in the National School of Arts and Trades, retaining this position until a year ago.

As a writer he was unusually prolific, having a very long list of reports and articles to his credit. No author's name has appeared so frequently as his in this journal. His articles were in part reports of his studies and in part popular accounts of the work of others and their applications in practice. He covered a wide range both in his studies and in his writings—fertilizers, soils, climatic influences, the manuring and culture of crops, the physiological functions of plants and animals, the feeding of live stock, methods of analysis and of investigation, statistics, and the nutrition of man were all within the purview of his wide activity. In 1879 he published a book on the nutrition of plants, in 1893 one on animal nutrition, and in the same year a popular work on the use of fertilizers and manures.

Few men have been more active or successful in the popularization of agricultural science and in bringing its teachings into practice. As far back as 1861 when the *Temps* was founded, he became its agricultural editor and served in that capacity for a long series of years. In 1867 he began contributing to the *Journal d'Agriculture Pratique*, and in 1893 he was made its editor in chief. Under his direction this journal became known throughout the world as an accurate and reliable source of information.

Grandeau was a natural leader in agricultural affairs, who was turned to in connection with large public enterprises. He arranged for and directed the International Congress of Experiment Stations in 1881 and 1882, and prepared a report on the latter gathering. In addition to the proceedings, this report contained a large amount of statistical information regarding the history, organization, work, and publications of the experiment stations throughout the world, together with articles on special subjects in agricultural science. He was reporter for the international jury on agronomy and agricultural statistics at the Paris Exposition of 1889, and likewise for the international jury on agriculture and horticulture at the exposition of 1900, publishing voluminous and valuable reports on each occasion.

To him was also assigned the task of preparing the general report on agriculture at the Paris Exposition of 1900. This he made a comprehensive review of the agriculture and the agricultural institutions of the world at the close of the nineteenth century, a work of four large volumes. This was the last great accomplishment of his life and was a work in which he took great pride. It will remain as a monument to his industry and his broad grasp of the subject.

Public recognition of the services and the place occupied by Grandeau are evidenced by the honors and offices conferred upon him. In addition to the positions already mentioned, he was a member of the Superior Council of Agriculture, of the National Society of Agriculture, and vice president of the Society for the Encouragement of Agriculture in his own country, and was also elected to membership in the Royal Society of England, the Imperial Agricultural Society of Moscow, the Royal Agricultural Academies of Turin and of Sweden, and many others. In 1900 the French Government conferred upon him the order of Commander of the Legion of Honor, and in 1908 the National Society of Agriculture awarded him a gold medal in consideration of the services rendered by him for more than 50 years, an honor which the history of his active life highly merited.

Oskar Kellner, director of the agricultural experiment station at Möckern, Germany, was born May 13, 1851, at Tillowitz, near Falkenberg, in the Prussian Province of Silesia. Following the Franco-Prussian War, in which he took part, he studied chemistry and the natural sciences at the universities of Breslau and Leipsic, taking special work at the latter institution under Knop and Sachsse, and made his doctorate at Leipsic in 1874. For two years following he was assistant in the experiment station for animal physiology at Breslau, under Hugo Weiske. This position gave him opportunity to enter upon the field of investigation in which he was later to make such notable contributions.

In 1876 he went to the experiment station at Hohenheim, where under Emil von Wolff, one of the founders of the modern theories of animal nutrition, he continued investigations in this line, one of his notable studies on the effect of muscular activity on the metabolism of the horse being a product of that period. It is an interesting and significant fact that at this early date, four years before the publication of Rubner's epoch-making paper on the replacement values of the principal organic nutrients and nine years before Lehmann, Zuntz, and Hagemann's first respiration experiments on the horse appeared, we find Kellner investigating the utilization of the potential energy of carbohydrates and of fats in work production, and devising a general experimental method for this purpose, substantially according to which the subsequent experiments at Hohenheim were made.

From 1881 to 1893 Kellner was professor of agricultural chemistry in the University of Tokio, being likewise technical adviser in the ministry of agriculture and commerce. Here he continued his researches, publishing a long series of papers in collaboration with his students. The establishment of experiment stations throughout Japan and the introduction of commercial fertilizers in that country are attributed largely to his efforts.

Following his twelve years in Japan, in 1893 he was appointed director of the Möckern Experiment Station to succeed Gustav Kühn, who had died the previous year. The eighteen years which followed was the period in his life which made him famous as a leader in the advanced theories of animal nutrition. He brought to his work a thorough preparation, a keen perception, and an energy and perseverance which were the foundations of his success.

His first undertaking was to compile and publish the work left by his predecessor, covering a period of nearly twenty years and representing a large part of the life work of this eminent investigator. This summary was issued in 1894, occupying an entire volume of *Die landwirtschaftlichen Versuchs-Stationen*, nearly six hundred pages.

Kühn had followed in the lines of Henneberg and Stohmann in employing the respiration apparatus to study the utilization of feeding stuffs under different conditions. Kellner supplemented the respiration experiments with calorimetric determinations of the energy value of the feeds employed and of the animal excreta, in accordance with the teachings of Rubner, and by this means established nutritive values for many feeding stuffs and their individual constituents. As subjects he employed full-grown steers and oxen, and later milch cows, while Zuntz studied in a similar way the nutrition of the horse.

This new point of view, which involved the study of the metabolism of both matter and energy under different conditions of feeding, resulted in marked advance in the theory of nutrition. It showed that like amounts of digestible nutrients in different feeds have different values and that the energy required for digestion and losses due to decomposition, etc., must be taken account of in arriving at the net or available values. This conception of the gross energy as having a varying net value furnished the basis for a new means of estimating net values of feeding stuffs, and upon this basis Kellner worked out his system of "starch values" as a means of comparing feeds and calculating rations.

Kellner's investigations on the metabolism of matter and energy in cattle covered seventeen years of work and included both maintenance and fattening conditions. He also studied the energy and nutrient requirements as a basis for the refinement of the feeding standards, and determined the digestibility of numerous materials and the action of the individual nutrients. A long list of new feeds was studied, including the molasses preparations; and his experiments were extended to milch cows to determine the action in milk production of various classes of feeds.

Kellner's work illustrates the skill and the industry of the man and his mastery of this intricate subject. Its brilliant and advanced character ranked him with the foremost leaders in the world, and made him a worthy successor to such men as Wolff, Henneberg, and Kühn.

The theories and reforms worked out by Kellner were embodied in his well-known book on the nutrition of farm animals (Die Ernährung der landwirtschaftlichen Nutztiere), an important product of his life work, published in 1905, which rapidly passed through five editions. This was followed by a smaller manual on the principles of feeding (Gundzüge der Futterrungslehre), three editions of which have appeared, and which has been translated into several languages.

Since 1905 Doctor Kellner had edited *Die landwirtschaftlichen Versuchs-Stationen*, the organ of the German experiment stations and one of the foremost periodicals of its kind in the world; and since 1902 he had been in editorial management of the *Zentralblatt für Agrikulturchemie*, a standard abstract journal of wide scope. He was also a frequent contributor to the leading agricultural press of Germany, and since 1907 had furnished the data and discussion on feeding for the *Landwirtschaftlicher Kalender*, in which his starch values were employed. In recent years he had published several summaries of cooperative feeding trials on horses, cattle, and swine.

So far as his time permitted he entered energetically into the activities of various agricultural bodies and of the German Agricultural Society. He had been a member of the executive committee of the latter society since 1904, and had frequently taken part in its meetings and delivered many addresses before its sections. A few weeks before his death he had accepted election to the special committee on feeding and was to have entered at once upon its work. Kellner's experience also made him a leading force in the German Agricultural Council, a national organization composed of representatives from various parts of the Empire; and he was a member of the Agricultural Council of Saxony, and on the advisory council of the Imperial Biological Institute for Agriculture and Forestry.

Since 1903 Kellner had been president of the Association of German Experiment Stations, and was an active worker in it for many years. He felt the responsibility of the control work with which his station was charged, and gave his personal attention to trade relations and questions involved in this control. He had the courage of his convictions when once his mind was made up, and stood uncompromisingly for what he considered to be the right. He did not fail the association in offensive or defensive steps to maintain its position or enforce its obligations.

Many honors had come to Doctor Kellner in recognition of his services. The Order of the Red Eagle, third class, was conferred upon him by the Government, and he was named *Geheimer Hofrat*. The Swedish Academy of Agriculture made him a member, and on the occasion of the jubilee celebrating the one hundredth anniversary of the University of Breslau last year the medical faculty conferred upon him the highest academic recognition—its honorary degree of doctor of medicine, an honor of which he was justly proud.

Doctor Kellner had attended the International Dairy Congress at Stockholm the past summer and returned in full health and vigor. He went to Karlsruhe to preside at the convention of the Association of German Stations and was stricken with apoplexy on the eve of its meeting. His death, at the premature age of sixty years, came, therefore, as a great shock to his friends. He was to have retired from the office of president this year, and the decision had been reached to confer on him the title of honorary president in recognition of his prolonged service.

In announcing Doctor Kellner's death to the association, Professor Fresenius said of him: "As a conspicuous man of science he was an ornament to the association. He was one of the best among us—a noble man from head to foot. His memory, the grateful recollection of his service, will long remain with us."

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Handbook of biochemistry, edited by C. OPPENHEIMER (*Handbuch der Biochemie des Menschen und der Tiere. Jena, 1909, No. 22–23, pp. 369–392+VII+593–736+96, fig. 1*).—These parts of this handbook contain the following chapters: Chemistry of the lungs and chemistry of new formations, excretory glands and excretions, including the chemistry of normal and pathological urine, urinary sediments and concrements, and the physical chemistry of the urine, amniotic fluid, energy exchange, and interchange of material between mother and fetus.

The nature of enzym action, W. M. BAYLISS (*London, New York, and Calcutta, 1911, 2. ed., pp. XI+137, figs. 7*).—This is the second edition of this book, and deals with catalysis in general, enzyms as catalysts, physical and chemical properties of enzyms, general methods of preparation and of investigation, reversibility of enzym action, the velocity of reaction and the various conditions affecting it, the nature of the combination between enzym and substrate, coenzyms and antienzyms, zymogens, and oxidation processes and certain complex systems. A list of literature and some supplementary notes are appended.

Catalase, F. BATTELLI and L. STERN (*Ergeb. Physiol., 10 (1910), pp. 531–597; abs. in Chem. Abs., 4 (1910), No. 22, p. 3084*).—This is a general review of the subject and deals with the isolation, properties, and mode of action of catalase. It gives comparisons in regard to the action of different metals on hydrogen peroxid and the effect of different agents, such as light and electricity, on the activity of the reaction and the nature of the mechanism of the reaction. The relation of catalase to reductase, oxidase, peroxidase, and the distribution of catalase in animal and plant tissues are discussed. Anticatalase, philocatalase, and some hypotheses are also described. (See also a previous note, E. S. R., 24, p. 411.)

Preparation of the 24-hour lactic acid yeast (*Pure Products, 6 (1910), No. 10, pp. 599–601, fig. 1*).—A description of a quick lactic acid yeast-producing apparatus.

Action of the Bulgarian ferment upon the proteins and amids, J. EFFRONT (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 22, pp. 1007–1009*).—The author has continued his studies on the action of the Bulgarian ferment (lacto bacillin) upon certain proteins and their derivatives, using barley germ decoction, peptone (with and without glucose or asparagin), and milk, and in the presence of calcium carbonate.

The results show that the acidity formation is much in excess of the sugar decomposed, but that ammonia is simultaneously produced. In the case of milk the acids present were found to be acetic, formic, propionic, succinic, lactic, and malic. Casein and albumin were completely decomposed.

(See also a previous note, E. S. R., 21, p. 21.)

In regard to the action of the Bulgarian ferment upon protein substances, G. BERTRAND (*Compt. Rend. Acad. Sci. [Paris], 151 (1910), No. 24, pp. 1161, 1162; abs. in Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 19–20, p. 501*).—The

Bulgarian ferment was found to attack casein to only a very small degree. In this respect the author's findings do not agree with those of Effront noted above, and the author believes that the latter had a contamination with some foreign organism.

In regard to the Bulgarian ferment, J. Effront (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 8, pp. 463–465; abs. in Centbl. Bakt.* [etc.], *2. Abt., 30 (1911), No. 19–20, pp. 501, 502*).—The author has continued his work in this direction, and now reports the results with Bertrand's Bulgarian ferment and Jaourt's ferment (Lactobacilline, Maya bulgare, and Maya nutricia). All the latter preparations mentioned converted milk to a yellow fluid, while Bertrand's ferment produced a jelly-like coagulum.

The results in detail were as follows: The percentage of nitrogen in the form of amids was 16.2 for Bertrand's Bulgarian ferment and from 71 to 87 for Jaourt's artificial preparation, the total acidity expressed as tenth-normal alkali in 100 cc. solution was 280 cc. for Bertrand's ferment and from 78 to 110 for Jaourt's; and the volatile acid expressed as tenth-normal alkali per 100 cc. was 18 cc. for Bertrand's ferment and from 55 to 88 for Jaourt's.

Contributions to the biology of colostrum, J. Bauer (*Deut. Med. Wchnschr., 35 (1909), No. 38, pp. 1657–1659; abs. in Hyg. Rundschau, 20 (1910), No. 11, pp. 616, 617*).—An antiserum was prepared with which it was possible, with the aid of the complement binding method, to differentiate colostrum from cow's milk. The antiserum deviated with the same colostrum in dilutions up to 1:100,000, but with cow's milk and bovine serum it was only specific in dilutions of 1:10,000. The colostrum of the first day evidently contains bodies which act as antigens and which are also contained in the blood serum but not in the milk of the same type of animal. First-day colostrum is also hemolytic for guinea-pig corpuscles, while milk is not.

The relation between milk, colostrum, and serum of the cow, F. Graetz (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 9 (1911), No. 5, pp. 677–708; abs. in Chem. Abs., 5 (1911), No. 15, 2500*).—It was determined with the precipitin, anaphylaxis, and complement-fixation tests that there is only a quantitative relation between these 3 fluids and not a qualitative one. Colostrum takes the intermediate position.

Estimating the fat in milk by the Rose-Gottlieb method, C. Huyge (*Rev. Gén. Lait, 7 (1909), No. 12, pp. 265–272; abs. in Molk. Ztg.* [*Hildesheim*], *24 (1910), No. 13, p. 218*).—Tests were conducted with Rohrig's apparatus, and the results show that the upper ethereal layers contain more fat than the lower ones. The author claims that better results may be obtained if the glass cock of the apparatus is placed lower down and the whole ethereal layer is used for the determination. Two washings are made with ether after drawing off the fluid. (In this regard see also a previous note (E. S. R., 23, p. 217).)

A note in regard to the estimation of fat by the modified Rose-Gottlieb method, C. Huyge (*Rev. Gén. Lait, 8 (1910) No. 14, pp. 326–328, fig. 1*).—The author found the Eichloff and Grimmer siphon method (E. S. R., 23, p. 217) to furnish good results.

Fat estimation in milk, W. Fahrion (*Chem. Ztg., 34 (1910), No. 73, pp. 648, 649*).—A claim of priority in regard to the Rose-Gottlieb method as modified by Eichloff and Grimmer (E. S. R., 23, p. 217), with some additional recommendations.

A further examination of the "neu-sal" method of Wendler for the determination of fat in milk, E. F. Notbohm and J. Angerhausen (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 8, pp. 495–498; abs. in Chem. Abs., 5 (1911), No. 3, pp. 535, 536*).—The reagent used in the method (E. S. R., 23, p. 614) consists of a mixture of the salts of salicylic and citric acids colored blue. It has the advantage of giving a better solution of the proteins, etc., of the milk, is easier and cleaner to handle, and the final temperature of 45° C. makes it easier to get a proper reading of the fat column.

Thirty-five samples of milk were tested, including skim, sour, and sweet whole milks, and cream, preserved with formaldehyde, potassium bichromate, and copper sulphate. When compared with other methods, such as the old acid butyrometric method and Gottlieb's (E. S. R., 3, p. 499), it was noted that the "neu-sal" gave the highest results. With boiled milk the reagent is not a good one.

The "neu-sal" method, W. Grimmer (*Milchw. Zentbl., 6 (1910), No. 9, pp. 409, 410*).—Comparative tests were made between the "neu-sal" acid butyrometric and Rose-Gottlieb methods, which show that the "neu-sal" method has no particular advantage in regard to the technique over the acid butyrometric method. In most instances it gave lower results than the Rose-Gottlieb method.

Wendler's "neu-sal" method for estimating fat in milk, M. Siegfeld (*Molk. Ztg. [Hildesheim], 24 (1910), No. 38, pp. 713, 714*).—A comparative test between the acid butyrometric, the "neu-sal," and Rose-Gottlieb methods is reported, in which it is shown that the "neu-sal" method yields good results and has the additional advantage of not corroding the apparatus, injuring the hands, etc.

Utilizing the "neu-sal" method for sheep and goat's milk, C. Beger (*Milchw. Zentbl., 6 (1910), No. 9, pp. 410–412*).—The author conducted tests with the acid butyrometric apparatus and the "neu-sal" reagent diluted once, and he concludes that the method furnishes a test which is free from danger in the hands of the laity. The results compare well with those obtained with the acid butyrometric method. The method can not, however, be employed where milk is preserved with large amounts of formaldehyde

The "neu-sal" method, O. von Sobbe (*Milchw. Zentbl., 6 (1910), No. 9, pp. 407–409*).—The author discusses the comparative results obtained with the "neu-sal," acid, and Rose-Gottlieb methods. He states that the "neu-sal" method is somewhat inconvenient to manipulate, and that he found some inaccuracies in the graduation of the apparatus

In regard to O. von Sobbe's work with the "neu-sal" method, O. Wendler (*Milchw. Zentbl., 6 (1910), No. 10, pp. 471–473*).—The author in reply to the above states that he is at a loss to understand O. von Sobbe's findings, especially in view of the fact that other workers report favorably on the method.

The "neu-sal" method for fat, O. von Sobbe (*Milchw. Zentbl., 6 (1910), No. 12, pp. 563–565*).—A reply to O. Wendler's criticism (see above).

Estimation of the fat content of butter by the "sal" method, Hesse (*Milch Ztg., 39 (1910), No. 38, pp. 449, 450*).—Comparative tests were conducted between the Funke shaking out[a] and the Rose-Gottlieb methods, and the "sal" method (E. S. R., 17, p. 1134). The "sal" method was found to be rapid and on a par with the shaking out method, and the author concludes that it can be recommended for the analysis of butter.

The examination of cream with the "sal" method, Hesse (*Milch Ztg., 39 (1910), No. 42, pp. 495, 496*).—A comparative test between the "sal," Rose-Gottlieb, Spritz, and dilution methods is reported. It is noted that the "sal" method yields results which are from 0.4 to 0.5 per cent lower than those obtained by any of the gravimetric methods. A few notes in regard to manipulating it are given.

Estimation of fat in buttermilk, M. Siegfeld and M. Kersten (*Molk. Ztg. [Hildesheim], 24 (1910), No. 48, pp. 903, 904*).—The authors cite the various causes for the low results in estimating the fat in buttermilk, and report tests made to determine how the fat content estimated in the dairy agrees with that estimated in the laboratory by the Gerber method and the true fat content as estimated by the Rose-Gottlieb method.

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[a] Milch Ztg., 36 (1907), No. 50, p. 592.

It is seen from the results that centrifuging for 6 minutes gives practically the same results as found in the dairy and with the Gerber method, but in order to obtain correct results centrifuging for a period varying from 12 to 36 minutes was necessary. By a series of further tests the authors showed that the formation of plugs could be prevented by cooling the milk before adding the sulphuric acid.

Comparative tests with the various methods of fat estimation in buffalo's milk, F. Baintner and K. Irk (*Kisérlet. Közlem., 13 (1910), No. 3, pp. 331–343*).—The methods considered were the Soxhlet, Adams, Liebermann-Székely, Rose-Gottlieb, Gerber's acidobutyrometric, Gerber's "sal," and Sichler's "sin-acid."

The Soxhlet, Liebermann-Székely, and improved Rose-Gottlieb methods are considered the most reliable and give good comparative results. The Liebermann-Székely method gives comparative results only when the volume percentage obtained by this method is compared with the Soxhlet percentage by weight. Gerber's acidobutyrometric method, using dilutions of 50 per cent, gives about the same results as obtained by the Soxhlet method, but in some instances slightly lower. The Gerber "sal" method and Sichler's "sin-acid" method are of no value in ordinary dairy practice.

A comparative test between Gerber's (Lobeck's) and Funke's catalase testers, Hesse (*Molk. Ztg. Berlin, 21 (1911), Nos. 1, pp. 1, 2; 2, pp. 13, 14*).—It was found that Funke's apparatus yields slightly lower results than Lobeck's (E. S. R., 23, p. 13). It was also noted that slight errors were introduced by dissolved gases present in the milk, but that these could be overlooked when recording the results. Funke's apparatus has the advantage of being cleaned more easily. Recommendations are made for conducting the tests more uniformly.

Improvement of the Wiley method for determining the melting points of fats, H. Steenbock (*Jour. Indus. and Engin. Chem., 2 (1910), No. 11, p. 480; abs. in Chem. Abs., 5 (1911), No. 1, p. 220*).—By dropping the melted fat upon cold mercury from a proper height and with a good control of temperature, disks of good shape can be obtained. When cooled the disks are removed to a beaker containing cold dilute 50 per cent alcohol, the beaker placed in a vacuum desiccator, and the air exhausted.

About honey and the judging of honey (*Chem. Weekbl., 7 (1910), No. 28, pp. 629–648*).—This work consists of 2 parts, the first by L. Van Giersbergen on the characteristics and external judging of honey, and the second by G. L. Voerman on the judging of honey by chemical analysis.

Identification and determination of the protein substance in honey, E Moreau (*Ann. Falsif., 4 (1911), No. 27, pp. 36–41*).—A discussion and description of methods.

In regard to estimating the shell content of cocoa, F. Filsinger and W. Bötticher (*Ztschr. Öffentl. Chem., 16 (1910), No. 23, pp. 467, 468*).—A reply to the criticism of Goske (E. S. R., 25, p. 206).

The significance of the acidity in judging foods and condiments, Loock (*Ztschr. Öffentl. Chem., 16 (1910), No. 17, pp. 330–336*).—The significance of the acidity of fats, oils, sausages, etc., in interpreting the analytical results is discussed.

Remarks on the iodometric titration of acids and Kjeldahl's nitrogen estimation, R. Koefoed (*Ztschr. Physiol. Chem., 69 (1910), No. 6, pp. 421–440;*

abs. in Jour. Chem. Soc. [London], 100 (1911), No. 579, II, pp. 67, 68).—The author points out that in conducting this test the specifications must be strictly adhered to in order to obtain correct results

The ammonia distillate is collected in a receiver containing 15 cc. of normal sulphuric acid until 100 cc. is obtained. In checking up the acid 15 cc. is diluted with boiled water to a total bulk of 100 cc. Ten cc. of a 5 per cent potassium iodid solution, 2 cc. of a 2 per cent starch solution (saturated with sodium chlorid), and 4 cc. of a 4 per cent potassium iodate solution are added to the solutions to be titrated. The iodin which is liberated during the process represents the unneutralized acid and is titrated with decinormal sodium thiosulphate solution.

Various substances, e. g., glycin and hippuric acid, were tested with the process. "In most cases Kjeldahl's original process (use of potassium permanganate) is recommended; in such cases where there is danger of formation of piperidin rings the Gunning modification (use of potassium sulphate) is more appropriate."

Determination of nitrates in water by a sulphosalicylic acid reaction, H. CARON and D. RAQUET (*Bul. Soc. Chim. France, 4. ser., 7 (1910), No. 23, pp. 1025–1027*).—The authors point out that with reagents composed of 1 per cent salicylic acid (or salicylate of soda) in sulphuric acid, and ammonia, there is a test for detecting nitrates and nitrate derivatives in water as sensitive as the Grandval and Lajoux phenol-sulphuric acid test.

A bacteriological method for determining available organic nitrogen, J. M. MCCANDLESS and F. C. ATKINSON (*Jour. Indus. and Engin. Chem., 3 (1911), No. 3, pp. 174, 175*).—The method used was as follows.

One gm. of cottonseed meal and 2 gm. of nitrolene or ammolene (leather fertilizers) containing 8.2, 9.4, and 3.42 per cent of total nitrogen, respectively, calculated as ammonia, were leached out with hot water. The cottonseed meal contained 0.73 per cent of water-soluble nitrogen, the nitrolene 5.34, and the ammolene 1.61 per cent, and aliquot parts of the solution were shaken with known amounts of soil. The filtrates from the mixture were placed in an incubator for 210 hours at a temperature of from 38 to 40° C., and under aerobic and anaerobic conditions.

The anaerobic samples showed no nitrate or nitrite formation The aerobic tests with ammolene showed a conversion of nearly 100 per cent of the water-soluble nitrogen to ammonia, while with nitrolene only about 63 per cent was converted. Cottonseed meal had a conversion of 30 per cent.

The soils were furthermore shaken up with a solution containing 1 gm. of potassium phosphate, 2 gm. of sodium chlorid, 0.5 gm. of magnesium sulphate, and 0.05 gm. of calcium chlorid, and 50 cc. of the filtrate, along with the residues remaining on the filter paper, was incubated for 26 days. The results showed a solution of the nitrogenous substances corresponding to 74.9, 70.9, and 82.5 per cent, respectively.

It is apparent from this work that the bacteria must first convert the insoluble proteins into soluble products and then into ammonia.

The determination of the amid nitrogen in proteins, W. DENIS (*Jour. Biol. Chem., 8 (1910), No. 5, pp. 427–435*).—The author utilized the principle of the Folin method[a] for estimating the ammonia in a mixture with amino acids resulting from the acid hydrolysis of proteins, e. g., edestin, casein, gelatin, and wool.

Substances rich in cystin yield less ammonia by this method than by the magnesia method. The procedure does not seem to interfere to any extent with the subsequent determination of mono- and diamino nitrogen by the Hausmann method as modified by Osborne (E. S. R., 15, p. 221).

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[a] Ztschr. Physiol. Chem., 37 (1902), p. 161; Amer. Jour. Physiol., 8 (1902–3), p. 330.

A colorimetric method for determining phosphoric acid, N. Passerini (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 7 (1910), No. 3, pp. 249–253*).—The method is based on the production of a yellow color by phosphomolybdic and gallic acids. Tests of soils with the method are given and compared with the usual molybdate method.

In regard to the determination of phosphorus in milk, E. Fleurent and L. Lévi (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 15, p. 1015*).—A polemical discussion in regard to the methods previously described (E. S. R., 25, pp. 312, 411). The authors show that the loss in the case of the organic phosphorus must not be ignored, as this is often as high as 21.3 per cent of the total organic phosphorus present in milk.

Electrolysis of humus solutions.—An improved method for the estimation of humus, J. B. Rather (*Texas Sta. Bul. 139, pp. 15*).—Following a suggestion made by Fraps and Hamner in a bulletin previously noted (E. S. R., 24, p. 302), in regard to the possibility of utilizing the electric current for removing suspended clay from soil solutions, the author as a result of his work concludes that "electrolysis removed most of the suspended clay from humus solutions and precipitated some of the humus. Electrolysis removed more clay than the Mooers and Hampton method. Electrolysis precipitated more clay than 1 gm. per liter of ammonium chlorid, but less than 2 gm. per liter of the salt. After precipitating the clay with 1 gm. per liter of ammonium chlorid the current used did not complete the precipitation of the clay. The presence of the salts interfere with the precipitation. Nitric nitrogen was formed by the current in the presence of free ammonia. Only a small amount of humus was precipitated by the current in the presence of 1 gm. per liter of ammonium chlorid, much less than by hydrochloric acid. In the absence of ammonium chlorid about a third of the humus was precipitated. All of the humus was not precipitated by hydrochloric acid. Humus and clay are precipitated from a neutral solution by the current. The electrolysis can not be used as a quantitative method for removal of clay or of estimation of humus."

Some further work on other methods of removing clay revealed that "evaporation and solution does not remove the clay completely. Clay in humus solutions may be precipitated by ammonium carbonate or carbon dioxid, and the precipitant disappears on evaporating and drying the residue. Precipitation of the clay with ammonium carbonate is more nearly complete than by evaporation and solution and is a much shorter method."

A brief bibliography is appended.

Detection and determination of small quantities of ethyl and methyl alcohol and of formic acid, R. F. Bacon (*U. S. Dept. Agr., Bur. Chem. Circ. 74, pp. 8*).—After discussing the amount of alcohol usually present in decomposed foods and the limitations of existing methods for determining the amount of alcohol in such foods, the author reports experiments which show that very small quantities of ethyl alcohol may be concentrated from salt solutions to a strength (from 2 to 4 per cent) at which they can be used for determining the amount of alcohol accurately by existing methods.

The author also studied the Vorisek method (E. S. R., 21, p. 705) for methyl alcohol in regard to its delicacy, and finally decided on the following method: "To 100 cc. of aqueous methyl alcohol in a 200 cc. distilling flask add from 5 to 8 gm. of chromic acid; collect 10 cc. of distillate and test for formaldehyde by the Leach or Hehner methods. If other oxidizable substances, such as acids, sugars, starches, proteids, etc., are present the solution under examination is exactly neutralized with sodium hydroxid and one-third of it is distilled, the distillate being oxidized and redistilled as has just been described. The use of the relatively large quantity of chromic acid indicated is found to increase the delicacy of the reaction. By the proposed method it is very easy to detect one part of methyl alcohol in 100,000 parts of water, and by making one preliminary distillation to concentrate the methyl alcohol, collecting the first 100 cc. from a liter and then proceeding as before described, a very strong test was obtained from a solution containing only one part of methyl alcohol per million.

"When testing for methyl alcohol in the presence of strong ethyl alcohol it is advisable to dilute the alcohol with water to obtain approximately a 20 per cent solution, as otherwise the action of the chromic acid on the ethyl alcohol may become explosively violent."

With the modified method it is possible to detect 0.1 per cent of methyl alcohol in 80 per cent ethyl alcohol, and with fractionation 0.01 per cent.

As formic acid is becoming of importance in regard to food products, the author studied its reduction with various substances, particularly as regards sensitiveness. The substances tried for this purpose were magnesium filings, metallic calcium, coppered zinc filings, coppered zinc dust, zinc amalgam, coppered aluminum, 1 per cent sodium amalgam, 1 per cent sodium amalgam with magnesium chlorid solution, aluminum, aluminum amalgam, zinc dust, and zinc filings. With a 1 per cent solution of formic acid the first 4 substances gave a positive reduction, the 5 following a negative result, and the 3 last only faint evidences of reduction. With 0.1 per cent solution of formic acid the first 4 substances mentioned gave a positive reduction. All things considered, magnesium filings seemed to give the best results, and form the basis of a qualitative method which is given.

The quantitative estimation of formic acid is accomplished as follows: "Distill the solution containing the formic acid with a small quantity of phosphoric acid until the distillate is no longer acid. If the volume of this distillate is too large to be conveniently handled, neutralize it with sodium hydroxid and evaporate to a convenient volume. Add an excess of platinic chlorid and sufficient acetic acid to make the solution strongly acid (usually about 1 or 2 cc. of glacial acetic acid for less than 1 gm. of formic acid), and boil the solution for 1 hour, using a reflux condenser. Collect the reduced platinum in the usual manner and weigh. The weight of the platinum multiplied by 0.472 equals the formic acid present."

The possibility of using the electrical conductivity method for this purpose is suggested.

In regard to Halphen's reaction, L. ROSENTHALER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 7, pp. 453, 454*).—The author determined the effect on the reaction (E. S. R., 10, p. 315) of substituting various other substances for amyl alcohol.

Positive results were obtained with methyl, ethyl, propyl, isobutyl, allyl, and benzylic alcohols, santalol, and amylene hydrate. With allyl alcohol the coloration obtained was orange, and with ethylene glycol after ¼ hour faintly red, becoming more intense 5 minutes later. With glycerin the reaction appeared only after ½ hour. When no alcohol at all was employed a faint red coloration was obtained after ¾ hour, which later became much more intense.

The determination of arsenic in insecticides, E. B. HOLLAND (*Jour. Indus. and Engin. Chem., 3 (1911), No. 3, pp. 168–171*).—This is a study of methods.

The author at first adopted Thatcher's suggestion for determining arsenious acid with the Mohr method, with particular regard to the ratio of the sample to be taken to the acetate solution (1:25). This was, however, found to be too small, and it was further noted that the practice of adding hydrochloric acid to the sample after boiling with acetate for 5 minutes seemed to yield results which were very variable and generally low.

The method was finally modified as follows: "Transfer 2 gm. of finely pulverized sample together with 50 cc. of sodium acetate (1:2) to a 500 cc. graduated flask and boil 5 minutes. Cool under tap, add about 60 cc. of hydrochloric acid (1:3) and shake until solution is effected. Make to volume and filter. Pipette 25 or 50 cc. into an Erlenmeyer flask, neutralize with dry sodium bicarbonate, add 25 cc. of sodium potassium tartrate (1:10) to redissolve precipitated copper, approximately 3 gm. of sodium bicarbonate, water sufficient to make a volume of 100 cc., 2 cc. starch paste (1:200), and titrate with normal-twentieth iodin to a permanent blue color. Toward the end of the reaction cork the flask and shake vigorously to insure proper end-point. Calculate results as arsenious oxid. The residue in the graduated flask is brought onto the filter, well washed, calcined in a porcelain crucible, and weighed as insoluble matter."

The process, according to the author, yields excellent results when used for copper aceto-arsenite, copper arsenite, and calcium arsenite. For determining arsenic acid the author investigated the Gooch-Browning-Haywood process (E. S. R., 19, p. 310), and modified this as follows: "Transfer 2 gm. of the finely ground sample together with 60 cc. of nitric acid (1:3) to a 500 cc. graduated flask, bring to boil, cool, make to volume, and filter. Pipette 50 or 100 cc. into a 150 cc. Jena Griffin beaker, add 10 cc. of sulphuric acid (2:1), evaporate, heat in an air bath at 150 to 200° C. to expel last traces of moisture, and then on asbestos board to the appearance of dense white fumes to insure complete removal of nitric acid. Add a small quantity of water, and when cold filter through a sugar tube under suction into a 300 cc. Erlenmeyer flask and wash to about 100 cc. Add 10 cc. of potassium iodid (165:1,000) and boil until free iodin is expelled—solution practically colorless—with the reduction of arsenic acid to arsenious acid: $As_2O_5+4HI=As_2O_3+4I+2H_2O$. Dilute, cool immediately, neutralize with sodium hydroxid, and render slightly acid with sulphuric acid. Add starch paste, and if any free iodin remains add dilute (normal-fiftieth) thiosulphate carefully with vigorous shaking to the absence of blue color: $2I+2Na_2S_2O_3=Na_2S_4O_6+2NaI$. Add excess of sodium bicarbonate and titrate as usual with normal-twentieth iodin, reporting as arsenic oxid. The residue in the graduated flask is brought onto the filter, washed, calcined, and weighed as insoluble matter."

Detection of dioxydiamidoarsenobenzol and its differentiation from inorganic arsenic in forensic cases, G. O. GAEBEL (*Arch. Pharm., 249 (1911), No. 1, pp. 49–56; abs. in Analyst, 36 (1911), No. 421, pp. 153, 154*).—According to the author dioxydiamidoarsenobenzol, which contains 34 per cent of arsenic, gives the Reinsch, Marsh, and Gutzeit tests for arsenic, and it may also be detected by a biological test with *Penicillium glaucum*. It may, however, be distinguished from the inorganic form with Bettendorf's reagent, which gives with it a yellow amorphous precipitate. The author also points out the readiness with which the organic complex in the molecule may be oxidized, and thus serve as a basis for several reactions.

[Miscellaneous analyses], E. F. LADD (*North Dakota Sta. Rpt. 1910, pp. 34–40*).—Analyses are reported of cows' and human milks, ammoniated lawn lime and other commercial fertilizer products, ground feed, a potato-bug killer, cement, clays, iron ore, sugar beets, and barley. Tests are also reported of the illuminating value of three samples of calcium carbid.

The problem of potato desiccation and its accomplishment by means of cooperation (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 1, pp. 5–21*).—This is a review of the work done in Germany on potato drying. The various phases of the problem discussed are the technical process of desiccation, the products of potato desiccation and their utilization, result of experiments as to the food value of desiccated potatoes, rules for the trade in the products of potato desiccation, and the accomplishment of potato desiccation by means of cooperative societies.

Crop plants for paper making, C. J. BRAND (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 82, pp. 19, figs. 3*).—This is substantially a reprint from another source (E. S. R., 25, p. 507), but the circular itself is printed on papers made from some of the crop plants described.

METEOROLOGY—WATER.

Practical meteorology, D. J. RICART Y GIRALT (*Mem. R. Acad. Cien. y Artes Barcelona, 3. ser., 8 (1910), No. 11, pp. 13*).—This article discusses various ways in which meteorological observations are being made of practical utility for navigation, agriculture, and health.

Meteorology, E. KLEINSCHMIDT (*Jahrb. Naturw., 26 (1910–11), pp. 122–142*).—This is a review in the usual form of recent progress in various meteorological lines.

Agricultural meteorology (*Rev. Sci. [Paris], 49 (1911), II, No. 3, pp. 85, 86; Rev. Vit., 36 (1911), No. 918, pp. 78–81*).—Reference is here made to a report of a committee authorized by the French parliament to investigate and report upon a plan of organization of a general service for agricultural meteorology in France.

[Meteorological observations], E. F. LADD (*North Dakota Sta. Rpt. 1909, pp. 18–30*).—Summaries are given in the usual form of observations during 1909 on temperature, rainfall, sunshine, wind velocity, and evaporation from a water surface.

On the theory of precipitation, V. LÁSKA (*Sitzber. K. Böhm. Gesell. Wiss. Math. Naturw. Cl., 1910, Art. XV, pp. 7, figs. 4*).—This is a continuation of the studies previously noted (E. S. R., 25, p. 508), applying a method of calculating rainfall extremes from means and quotients of variation to data reported by Hellmann.

On the electricity of rain and its origin in thunderstorms, G. C. SIMPSON (*Mem. Indian Met. Dept., 20 (1910), pt. 8, pp. 141–332, pls. 2; rev. in Nature [London], 85 (1910), No. 2142, pp. 80, 81*).—This paper records the results of measurements of electricity brought down by rain, and laboratory studies of the physical process by which electrical separation takes place during thunderstorms, and advances a new theory regarding the relation of electricity to the formation and breaking up of raindrops during thunderstorms. This theory is that there are normally present in thunderstorm areas upward currents of air of sufficient velocity to prevent the falling of raindrops and to cause a continuous cycle of "growth, breaking up (with separation of electricity), fresh growth, and so on, at a nearly constant height in the atmosphere until the charge is so great as to produce at a certain level a gradient larger than 30,000 volts per centimeter, which [is taken] to be the electric strength of air. When this limit is reached, a lightning flash neutralizes the accumulated charge over a limited area, and the process goes on repeating itself."

The influence of climatic factors on plant growth in general and particularly upon the yield of plants, P. VAGELER (*Tropenpflanzer, 15 (1911), No. 6, pp. 289–302*).—The influence of heat, light, and moisture upon the growth of plants, with particular reference to tropical conditions is discussed.

Protection of crops against the weather, P. BEHRENT (*West Preuss. Landw. Mitt., 16 (1911), No. 11, p. 92; abs. in Internat. Inst. Agr. [Rome], Bul. Bur.*

Agr. Intel. and Plant Diseases, 1911, No. 3, p. 503).—This is a discussion of various means of preventing or mitigating the effects of frosts, wet and dry spells, and excessive snowfall.

Field ventilation, a new method of preservation against spring frosts, F. CHAVERNAC (*Prog. Agr. et Vit.* (*Ed. l'Est-Centre*), *32* (*1911*), *No. 7, pp. 211–213; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 3, p. 504*).—The author proposes the installation of electric ventilators to create currents of air to increase the effect of smudges in preventing frosts in vineyards and orchards.

The constitution of water, J. DUCLAUX (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 21, pp. 1387–1390*).—This article deals with certain anomalies in the physical properties of water, particularly the increase of volume at the freezing point. This phenomenon is attributed to polymerization.

Progress in the chemistry of water, C. BLACHER (*Chem. Ztg.*, *35* (*1911*), *Nos. 40, pp. 353, 354; 41, pp. 370–372; 43, pp. 390–392; 44, pp. 398, 399*).—This is a critical review of the more recent investigations on the constitution of water, water analysis, judging water, behavior of water in steam boilers, purification of water, and metallic corrosion by water.

The chemical composition and biological properties of water, J. KÖNIG, J. KUHLMANN, and A. THIENEMANN (*Landw. Jahrb.*, *40* (*1911*), *No. 3–4, pp. 409–474, pls. 4, figs. 7*).—This article reports studies of the effect on the physical and chemical properties and on the natural flora and fauna of water of the addition of various inorganic and organic substances. There was found to be a relation between the chemical composition and biological properties of water, and it is concluded, therefore, that both chemical and biological examinations are necessary in judging as to contamination.

Ground water level and cultivation, M. RINGELMANN (*Jour. Agr. Prat.*, *n. ser.*, *21* (*1911*), *No. 17, pp. 525–528, figs. 3*).—This article discusses the inclination and depth of the water table in relation to plant growth and to methods of cultivating, draining, and irrigating the soil.

Wells, M. RINGELMANN (*Jour. Agr. Prat.*, *n. ser.*, *21* (*1911*), *Nos. 19, pp. 595–597, figs. 3; 20, pp. 623–625, figs. 2; 21, pp. 656, 657, figs. 3; 23, pp. 724–726, figs. 2; 24, pp. 752, 753, figs. 3; 25, pp. 782–784, figs. 2*).—In continuation of previous articles on the construction of wells, the author gives information regarding the lining and curbing of wells, and discusses the feeding (maintenance of the water supply) of wells, ventilation of wells, temperature of water in wells, composition of waters from different geological formations, and contamination of wells.

Surface water supply of the Lower Mississippi basin, 1909, W. B. FREEMAN and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 267, pp. 99, pls. 2, fig. 1*).—This is a report of measurements of flow of water in this area, including the drainage basins of the White, Arkansas, and Yazoo rivers.

Surface water supply of the western Gulf of Mexico, 1909, W. B. FREEMAN and R. H. BOLSTER (*U. S. Geol. Survey, Water-Supply Paper No. 268, pp. 107, pls. 6*).—This is a report of measurements of flow of water in this area, including the Rio Grande drainage basin.

Geology and underground waters of northeastern Texas, C. H. GORDON (*U. S. Geol. Survey, Water-Supply Paper No. 276, pp. 78, pls. 2, figs. 6*).—This is a report of a study of underground waters of an area of 5,989 square miles, comprising the counties of Bowie, Red River, Lamar, Delta, Hopkins, Franklin, Titus, Morris, Camp, and Cass. The geography, physiography, and geology of the region are also briefly discussed.

Ground water in Juab, Millard, and Iron counties, Utah, O. E. MEINZER (*U. S. Geol. Survey, Water-Supply Paper No. 277, pp. 162, pls. 5, figs. 13*).—

This is "a report on the water resources of an important section of central Utah, including a discussion of rainfall, soil, vegetation, streams, and industrial development. The occurrence of ground water is described and its quality considered. Its availability for irrigation, culinary supplies, and boiler supplies is given special attention. Watering places on routes of travel in the vicinity of the Sevier Desert are listed, and the report concludes with detailed descriptions of the water resources of the region."

Quality of the water supplies of Kansas, H. N. Parker (*U. S. Geol. Survey, Water-Supply Paper No. 273, pp. 9–348, pl. 1*).—This paper reports the results of an investigation, conducted in cooperation with the Kansas State Board of Health, to determine the quality of the water supplies of the State. It describes briefly the salient geological features in order that their relation to the water supply may be understood and contains 185 tables, giving analyses of the different waters. The underground sources are discussed separately, by counties, and the surface streams by river basins.

Preliminary report on stream pollution by mine waters in southeastern Kansas, E. H. S. Bailey (*U. S. Geol. Survey, Water-Supply Paper No. 273, pp. 349–361, fig. 1*).—Analyses of waters from lead, zinc, and coal mines and from concentration mills, as well as some studies of the effects of such waters on fish and on metals are reported.

Modern methods of water purification, J. Don and J. Chisholm (*London, 1911, pp. XVI+368, illus.; rev. in Nature [London], 86 (1911), No. 2173, pp. 543, 544*).—This book deals with sources of supply; causes, detection, and prevention of pollution of water; storage, filtration, purification by means of ozone, distillation, and water softening and testing; and household plumbing and appliances.

Denitrifying bacteria of percolating beds, Lemoigne (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 26, pp. 1873–1875; abs. in Rev. Sci. [Paris], 49 (1911), II, No. 2, p. 61*).—Various organisms occurring in percolating beds were isolated and studied. Among these were found several which rapidly destroyed nitric acid. Two species apeared to be particularly abundant, *Bacillus subtilis* and a closely allied species. It was found that aeration favored denitrification with these bacteria, which were not able to utilize the oxygen of nitrates for their respiration.

The purification of sewage by the soil and by bacterial beds, A. Müntz and E. Lainé (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 19, pp. 1204–1208; abs. in Rev. Sci. [Paris], 49 (1911), I, No. 20, p. 635; Jour. Chem. Soc. [London], 100 (1911), No. 585, II, p. 639; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 5, pp. 1029, 1030*).—In the experiments here reported. which were a continuation of those previously noted (E. S. R., 22, p. 421), destruction of organic matter by oxidation with loss of gaseous nitrogen was much less and nitrification was more rapid in the soil than in artificial bacterial beds. In these experiments the loss of nitrogen from sewage was 16.36 per cent during purification by soil and 60 per cent in septic tanks.

The agricultural use of sewage, A. Müntz and E. Lainé (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 26, pp. 1814–1818; abs. in Rev. Sci. [Paris], 49 (1911), II, No. 2, p. 59; Rev. Gén. Agron., n. ser., 6 (1911), No. 6–7, pp. 241–245*).—Attention is called to the fact that the use of sewage for irrigation not only results in its purification but also serves a useful purpose in supplying water and fertilizer to the soil. The authors studied not only the amount of fertilizing matter carried by sewage but also the best amounts of sewage to use for irrigation on different soils and crops. They reached the conclusion that if the sewage waters of Paris could be carried to agricultural areas of sufficient size they could be made to fertilize an area from 10 to 15 times that on which they are now actually used.

A study of sewage from the point of view of purification and utilization in agriculture, A. MÜNTZ and E. LAINÉ (*Ann. Inst. Nat. Agron., 2. ser., 10 (1911), No. 1, pp. 5–48*).—This is a more detailed account of the investigations noted above.

SOILS—FERTILIZERS.

Studies on soil physics, W. H. GREEN and G. A. AMPT (*Jour. Agr. Sci., 4 (1911), No. 1, pp. 1–24, figs. 5; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 12, p. 759*).—This paper defines and attempts to construct a scientific basis for three fundamental soil constants, (1) the specific pore or interstitial space, (2) permeability to water, as well as permeability to air, and (3) capillarity coefficient, and describes methods and apparatus used for their mesurement, with results obtained with 3 types of soil—clay, loam, and sand.

"The specific pore or interstitial space [is] defined as the free space per unit volume of soil.

"The permeability to water [is] measured by that volume of water which will pass per second through a soil column of unit length and of unit area of cross section when under 1 cm. head of water pressure. The permeability to air may be similarly defined.

"The capillarity coefficient [is] defined as the tension due to capillary forces per unit area of cross section of the pore spaces which tends to draw the water from the saturated to the dry region of the soil."

The moisture content affected strongly the pore space and permeability of the soils. Permeability was dependent upon the average pore space, and was influenced also by the system of arrangement of the soil particles. The soils differed markedly in their constants, as was illustrated by the wide ratio between the permeability of clay soils for water and of air, indicating that the water has the effect of swelling out the colloidal matter in the soil, thus constricting the capillary passages.

The authors deduce formulas connecting the movements of air and water with the soil constants, and suggest that such measurement of pore space, permeability, and capillarity "is of more importance than, and should replace, the determination of the sizes of soil particles as in the usual 'mechanical analysis' of soils."

The determination of the absorptive capacity of soils by the Knop method, M. A. EGOROV (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 3, pp. 349–356*).—This article reports the results of experiments to test the effect of antiseptics, chloroform, and of the length of standing on the absorption coefficient of soils.

The conclusions reached are that (1) with the antiseptics the length of standing had no effect on the absorption coefficient; (2) the absorptive capacity of the soils was, in general, higher without the chloroform than with it; (3) different soils without the antiseptics varied in their absorptive capacity for a given length of time, the absorption coefficient of chernozem and loess soils decreasing and of podzol soils increasing on standing.

A comparison of the effect of different antiseptics showed that toluol gave the best results. Chloroform and thymol did not completely inhibit bacterial activity, and the latter increased the absorption coefficient.

The author suggests that antiseptics be used in connection with the usual Knop method of determining the absorptive capacity of soils, inasmuch as soil samples are usually taken under dissimilar conditions which cause variations in the microflora and therefore in the absorption coefficient.

The moisture of typical semiarid and alkali soils in relation to their stage of formation, S. K. Chaianov (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 12 (1911), No. 3, pp. 321–348, figs. 6*).—This article reports the results of observations during 1908, 1909, and 1910 on the moisture of a virgin soil. The work is divided into a description of the morphology, mechanical and chemical composition, and flora of the soil, and determinations of the moisture, soluble salts, and carbon dioxid of loam and alkali soils at different depths and seasons of the year.

It was found that all changes in moisture of alkali soils occurred in the upper layers, not exceeding a depth of 25 cm. (9.85 in.). The water almost never penetrated beyond these layers.

The moisture of typical semiarid soils varied to a depth of 150 cm. (59.1 in.). There was a pronounced increase in depth of penetration of moisture in spring, and it extended still deeper in summer. During dry years the moisture of typical semiarid and alkali soils was substantially the same, the former being slightly more moist in spring. The moisture content and permeability of alkali soils are determined by the characteristics of the 25 to 35 cm. (9.85 to 13.79 in.) layers.

The salt content of semiarid loam soils may be decreased by the movement of water in the soil, whereas the salt content of alkali soils continually increases.

Carbon dioxid in ground air, G. I. Joukow (*Khozi͡aistvo, 6, (1911), No. 2, pp. 37–46; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 3, pp. 510, 511*).—From a study of factors influencing the carbon dioxid of soil air the following conclusions were reached:

"Fallows treated with dry-farming methods of frequent cultivation, in order to maintain moisture and a high temperature in the soil, contain more carbon dioxid than those less cultivated. In April fallows the content of carbon dioxid increases during summer and reaches a maximum in August. This content varies according to depth between a maximum at 30 cm. and a minimum at 10 cm. Farmyard manure increases the content of carbon dioxid in the soil. . . . Carbon dioxid accumulates in greater quantity in the air of soils where lucerne, beets, clover, and potatoes are grown than in uncultivated soils. Sandy soils are much less rich in carbon dioxid than those containing organic matter, especially peaty soils."

On carbon dioxid in ground air, A. Suprunenko (*Zap. Novo-Alexsandri. Inst. Selsk. Khoz. i Li͡esov., 21 (1910), No. 1, pp. 59–63; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 3, pp. 511, 512*).—The author concludes from his investigations that "the quantity of carbon dioxid contained in the air of the soil is never enough to injure vegetation; it varies according to the nature of the soil. . . . The content of carbon dioxid in proportion to the depth can only be ascertained on fallow soils, the position and development of roots in cultivated soils causing irregularities. . . . Light rains after a long period of drought increase the carbon dioxid in soils, which shows that they awaken the activity of plants and micro-organisms. Abundant rains produce a contrary effect."

The production of plant food in the soil, E. J. Russell (*Jour. Roy. Agr. Soc. England, 71 (1910), pp. 9–26, figs. 7*).—This article is based upon investigations on the effect of partial sterilization of soils already noted (E. S. R., 22, p. 121), and upon observations as to the growth of various crops in untreated and partially sterilized soils in pots.

The increased productiveness observed in the partially sterilized soils is ascribed, as in previous papers, primarily to the increased production of ammonia in the treated soils, and this in turn to the destruction by partial sterilization of the soil organisms which interfere with the activity of the ammonia-forming bacteria.

Experiments on ammonia and nitrate formation in soils, II, J. G. Lipman, P. E. Brown, and I. L. Owen (*Centbl. Bakt.* [*etc.*]; *2. Abt., 30* (*1911*), *No. 7–12; pp. 156–181; abs. in Jour. Chem. Soc.* [*London*], *100* (*1911*), *No. 585, II, pp. 649, 650*).—This is a second communication on this subject (E. S. R., 23, p. 621), and deals with ammonia formation from dried blood as affected by the mechanical composition of the soil, the amount of moisture and lime present, and various chemical and physical factors.

It was found that there were considerable losses of ammonia from well aerated soils, that ammonia formation was to a large extent controlled by the moisture content of the soil, that smaller applications of calcium carbonate stimulated ammonification but that larger additions depressed it, and, in general, that the rate of ammonification was controlled by a number of chemical and physical soil factors.

The authors conclude that the method of measurement of ammonia-formation may be used with success "for the study of a great variety of soil problems that concern the formation and transformation of soil humus, and, even more generally, of many problems that belong properly within the domain of soil fertility and plant nutrition."

The method employed was in brief as follows: "In all cases 100 gm. of material was employed. Water was added in amounts sufficient to create optimum moisture conditions; but because of the differences in the water holding power of the different ingredients 18 per cent of moisture was allowed for the soil itself, 12 per cent for the sand, and 60 per cent for the dried blood. In each case the soil, or the mixture of soil and sand, was placed in a tumbler; the required amount of dried blood added and thoroughly mixed with the soil, and the material was then moistened, the quantities of water added including the 6 cc. of fresh soil infusion employed in each case to provide abundant and uniform inoculation. The tumblers were covered with a Petri dish cover and kept in the incubator at 27 to 28° C. for seven days; at the end of that time the ammonia was distilled off into standard hydrochloric acid and the distillate titrated against standard ammonia."

The chemical nature of the organic nitrogen in the soil, S. L. Jodidi (*Iowa Sta. Research Bul. 1, pp. 3–46, fig. 1*).—A study of the organic nitrogenous substances in plats of Wisconsin drift soil treated in different ways similar to that on nitrogenous compounds in peat soils (E. S. R., 22, p. 618) is reported in detail in this bulletin. The same methods were employed in this investigation as in the earlier work, viz, those used by Hausmann and Osborne in protein chemistry. The plan of investigation was based upon the idea that soil organic matter or humus is a resultant of the decomposition of plants all of which contain a large if not a predominant proportion of nitrogen in the form of protein, and that in the decomposition of the protein there are formed (1) albumoses, (2) peptones (polypeptids), (3) amino acids and acid amids, (4) ammonia, (5) nitrites, and (6) nitrates.

The general method of procedure in separating the organic nitrogenous substances was to evaporate the hydrochloric acid extract of the soil practically to dryness and distill it with cream of magnesia, the ammonia obtained by this process representing the amids in the soil. The residue from the distillation with magnesia was extracted with water and the extract, after acidulating with sulphuric acid, was treated with phosphotungstic acid. The precipitate thus obtained contained the diamino acids and the filtrate from this precipitate represented the monamino acids. It was found that by these methods the bulk of the nitrogen present in the soil can be extracted and then separated into various groups of definite composition.

"The amount of total nitrogen extracted from the soil of the various plats examined, by boiling with hydrochloric acid, was on the average 75.83 per cent (from 71.12 to 81.2 per cent), the balance (from 28.88 to 18.8 per cent) having remained undissolved.

"The acid-soluble nitrogen is made up as follows: Ammoniacal nitrogen, from 1.22 to 1.97 per cent (from 0.99 to 1.14 per cent of the total soil nitrogen); nitric nitrogen, from 0.07 to 1.46 per cent (from 0.05 to 1.14 per cent of the total soil nitrogen); nitrogen of acid amids, from 25.23 to 33.03 per cent; nitrogen of diamino acids from 11.61 to 13 per cent; nitrogen of monamino acids from 22.2 to 55.66 per cent. The rest of the organic nitrogen consists of compounds other than acid amids and amino acids.

"By boiling with water, only a small proportion of nitrogen, namely from 2.92 to 9.96 per cent of total soil nitrogen, could be extracted from the various soils investigated. This, taken together with the fact that the bulk of the soil nitrogen is made up of acid amids and amino acids all of which are fairly soluble in water, makes it very likely that these compounds are present in the soil not in a free state, but in some kind of combination."

It was observed in plats which had received the more recent applications of organic manures that, with the exception of from 8 to 12 per cent, the organic nitrogen consisted of acid amids, diamino acids, and monamino acids, but in plats which had not been recently manured a considerable percentage, from 47 to 60 per cent, of compounds belonging to other classes than acid amids and amino acids were found.

"Since we have found that the organic nitrogenous compounds in Iowa soils as well as in Michigan peat soils are made up chiefly of acid amids and amino acids, despite a considerable variety of the sources of the organic nitrogen, it seems fairly safe to state that the bulk of the organic nitrogen in the majority of soils, if not in all, consists very likely of acid amids and amino acids."

The chemical nature of the organic nitrogen in the soil, S. L. Jodidi (*Jour. Amer. Chem. Soc., 33 (1911), No. 7, pp. 1226–1241; abs. in Chem. Abs., 5 (1911), No. 19, p. 3313*).—This article presents the more strictly chemical phases of work more fully reported above.

Organic nitrogenous compounds in peat soils, II, C. S. Robinson (*Michigan Sta. Tech. Bul. 7, pp. 22, figs. 2*).—This is a continuation of work previously noted (E. S. R., 22, p. 618), reviewing the results of investigations on the composition of the organic matter of peat soils and dealing particularly with 2 compounds, leucin and isoleucin, which were isolated from such soils in considerable quantities.

"The work reported in this paper and that done by Suzuki proves quite conclusively that a considerable portion of the nitrogen is present in the form of a protein compound or a mixture of such compounds which can be broken down on treatment with acids in the same manner as casein, egg albumin, etc. In the samples of peat studied for this work about 26 per cent of the total nitrogen was combined in this form in such a way that it could be converted by hydrolysis into primary amins, probably with the formation of amino acids. About 10 per cent of the total nitrogen is due to the presence of acid amids. From the work of Schreiner and Shorey purin, pyrimidin and pyridin compounds constitute a part of the remainder. The greater part is, however, present in forms concerning which we know nothing and which may represent the most important factors in aiding or inhibiting plant growth. It seems probable, from the work done so far, that the classes of compounds constituting this unknown residue are many. . . The greatest need at present in determining the value of the organic nitrogenous material of peat and humus is a closer knowledge of the individual substances actually present in such material and those which may possibly be formed by natural agents in the soil."

Biochemical relations of the phosphate ion in the soil, J. Stoklasa (*Centbl. Bakt.* [*etc.*], *2. Abt.*, *29* (*1911*), *No. 15–19*, *pp. 385–515*, *pls. 2*; *abs. in Jour. Chem. Soc.* [*London*], *100* (*1911*), *No. 583*, *II*, *p. 429*; *Zentbl. Agr. Chem.*, *40* (*1911*), *No. 9*, *pp. 577–585*).—This article deals primarily with the inorganic phosphates of soils and with the conditions under which they become soluble in water, especially the part played by micro-organisms in the transformation of the phosphates. It is shown, however, that there is a considerable proportion of organic phosphorus in fertile soils in form of phosphatids, phytins, and nucleoproteids.

The insoluble phosphates are rendered soluble and available as plant food mainly by the action of carbon dioxid and organic acids produced by the microorganisms of the soil. Bacterial activity is measured by the amount of carbon dioxid contained in the soil, and this varies widely with the physical and chemical conditions of the soil as well as its bacterial content.

Data are given showing the variation in rate of production of carbon dioxid by different kinds of soil organisms, and from these data it is estimated that under the conditions of these experiments soil organisms produced carbon dioxid at the rate of 75 kg. per hectare (66.75 lbs. per acre) to a depth of 40 cm. (15.76 in.) per day, besides other organic acids which dissolve phosphates and furnish food for the organisms.

The author holds that the cooperation which exists between autotrophic and heterotrophic organisms in the soil is not entirely explained by the death of the former providing the latter with assimilable carbohydrates. The autotrophic organisms always contain phosphatids from which the heterotrophic organisms obtain phosphorus in readily assimilable form.

The process of assimilation of phosphate by bacteria and its conversion by them into organic compounds is called by the author biological absorption of phosphoric acid in the soil. The intensity of this process varied greatly with the bacterial content of the soil, 98 per cent of phosphoric acid anhydrid being absorbed by an inoculated soil as compared with 66 per cent for an uninoculated soil. The biological absorptive capacity of the soil was closely related to the vegetative growth, and hence may be taken as an important factor in determining the productivity of a soil. Of the phosphoric acid anhydrid of sterilized soils from 40 to 52 per cent was absorbed as compared with from 60 to 92 per cent for soils not sterilized. From 2 to 2.3 gm. of free nitrogen was assimilated by Azotobacter per gram of phosphoric acid anhydrid. The addition of dipotassium phosphate greatly stimulated the development of bacteria in rather unproductive soils, thereby increasing the nitrogen content of the soil. In addition to increasing the nitrogen of the soil, appreciable quantities of easily assimilable mineral plant food, as the phosphate ions, were also made available by the action of the nitrogen-fixing bacteria of the soil. The amount of phosphoric acid anhydrid which was changed into organic phosphorus substances was larger with ammonifying bacteria than with Azotobacter.

The author found a definite relation between the assimilation of free nitrogen and the carbon and phosphoric acid contents of the soil. With nutrient solutions containing no phosphoric acid the bacterial growth was reduced to a minimum and the production of dry matter reduced to a point where its determination was impossible.

It thus appears that one of the principle functions of phosphorus in the soil is to aid in the promotion of bacterial action.

Phosphoric acid in relation to Australian soils and vegetation, T. CHERRY (*Jour. Dept. Agr. Victoria, 9 (1911), No. 2, pp. 71–74; abs. in Chem. Abs., 5 (1911), No. 13, pp. 2293, 2294*).—This article reports the results of analyses of soils and of native plants of Victoria, and calls attention to their relatively low phosphoric acid content. Surface soils generally contain from 0.5 to 0.15 per cent phosphoric acid, the volcanic and alluvial soils over 0.15 per cent.

Analyses of a number of characteristic native plants of the region showed only one-tenth of the phosphoric acid content of cultivated cereals grown on the same soil. "It would therefore appear that the native plants have established a kind of equilibrium in phosphoric acid with the soil."

The author is of the opinion that the bone diseases which affect animals kept too long on "kangaroo grasses" and similar grazing country may be caused by the low phosphoric acid content of the plants.

Soils of the Eastern United States and their use, VIII–XVIII, J. A. BONSTEEL (*U. S. Dept. Agr., Bur. Soils Circs. 30, pp. 15; 31, pp. 17; 32, pp. 18; 33, pp. 17; 34, pp. 15; 35, pp. 19; 36, pp. 16; 37, pp. 16; 38, pp. 17; 39, pp. 19; 40, pp. 15*).—These circulars deal respectively with the following soil types as surveyed and mapped by the Bureau of Soils: Circular 30, The Clarksville Silt Loam, of which a total area of 1,599,938 acres in 15 different surveys in 5 States has been surveyed and mapped; Circular 31, The Miami Clay Loam, of which a total of 2,281,482 acres in 18 areas in 5 States has been surveyed and mapped; Circular 32, The Marshall Silt Loam, of which a total of 4,084,230 acres in 20 areas in 7 States has been surveyed and mapped; Circular 33, The Knox Silt Loam, of which a total of 1,881,024 acres in 17 areas in 7 States has been surveyed and mapped; Circular 34, The Carrington Loam, of which a total of 1,601,088 acres in 14 areas in 6 States has been surveyed and mapped: Circular 35, The Memphis Silt Loam, of which a total of 1,863,290 acres in 12 areas in 6 States has been surveyed and mapped; Circular 36, The Fargo Clay Loam, of which a total of 601,024 acres in 6 surveys in 3 States has been surveyed and mapped. Circular 37, The Clyde Loam, of which a total of 561,068 acres in 11 areas in 4 States has been surveyed and mapped; Circular 38, The Dekalb Silt Loam, of which a total of 1,122,944 acres in 19 areas in 8 States has been surveyed and mapped; Circular 39, The Porters Loam and Porters Black Loam, of the former of which a total of 436,160 acres in 4 areas in 2 States has been surveyed and mapped and of the latter 193,550 acres in 7 areas in 2 States; and Circular 40, The Wabash Silt Loam, of which a total area of 801,256 acres in 28 areas in 9 States has been surveyed and mapped.

[Biological survey at McLeod, North Dakota], W. B. BELL (*North Dakota Sta. Rpt. 1909, pp. 57–62*).—This report presents observations and recommendations based upon a biological survey at McLeod, N. Dak., as to the most profitable utilization of the large area of sandy soils of which the vicinity is typical. The soils are classified as (1) McLeod sand, (2) Fargo fine sand, (3) Fargo fine sandy loam, and (4) dune sand. It is considered that these soils are suitable for dairying, truck farming, and fruit growing, and suggestions are presented regarding each of these lines. The amount of rainfall at McLeod is shown to have been 8.24 in. from June 25 to September 1, 1909.

Soil analysis, E. F. LADD (*North Dakota Sta. Rpt. 1910, pp. 31–34*).—Analyses of a number of samples of soils from 9 state demonstration farms as well as from other sources are reported.

Contribution to the study of molds, A. MAZZARON (*Bul. R. Soc. Toscana Ort., 3. ser., 16 (1911), No. 1, pp. 14–23; abs. in Rev. Gén. Agron., n. ser., 6 (1911), No. 5, pp. 193–195*).—This article reports the results of physical and chemical analyses of heath, black, and different forest molds commonly used in Italy. The author divides the molds on the basis of their mineral and organic matter content into (1) beech, heath, and black molds, and (2) forest molds. The beech, heath, and black molds were rich in mineral matter, but low in organic matter. The forest molds were low in nitrogen and phosphoric acid. There was substantially no difference in the moisture of the 2 classes of molds, but the forest molds had a higher retentive power for water.

Methods for arresting and utilizing moving alluvial mud (*Rev. Sci.* [*Paris*], *48* (*1910*), *II*, *No. 20*, *p. 628; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, pp. 213, 214*).—The mud along the Rhine and Meuse near Rotterdam is arrested and held by planting first *Scirpus lacustris* and later *Phragmites communis*, and is thus eventually rendered fit for grasses and sugar beets.

The maintenance of soil fertility, C. E. Thorne (*Quart. Rpt. Kans. Bd. Agr., 30* (*1911*), *No. 117*, *pp. 92–106*).—The author describes the methods of maintaining soil fertility employed at the Ohio Station, reaching the general conclusion "that in the present stage of the world's development this end is to be attained most economically through the production of live stock and the systematic saving and utilization of the resulting waste products, both at the stable and at the slaughterhouse; supplementing these products from the deposits of the mineral stores of combined nitrogen, phosphorus, and potassium; keeping the soil sweet with lime; and so adjusting our system of cropping as to provide for the greatest possible use of the nitrogen-gathering crops."

The feeding of crops and stock, A. D. Hall (*London, 1911, pp. XVI+298, pls. 23, fig. 1*).—This latest book by the director of the Rothamsted Experimental Station is described as an introduction to the science of the nutrition of plants and animals, which is intended "to give the student of agriculture a general framework of ideas before he enters upon the more detailed study of agricultural chemistry," and thus enable him to understand better and profit more from the later instruction in this subject. It is thought that the book will also be useful to the many students "who do not as a rule pursue the subject any further than it is carried in these pages," but "even more than for the student, this book is intended for the workaday farmer who wants to get an intelligent conception of how his crops and stock make their growth."

The author is of the opinion that "it should neither be difficult nor tedious for the man with an ordinary education to learn how a plant draws its nutriment from the soil and how the animal depends in its turn upon the plant. . . . Complex and unknown as many of these processes are, the main outlines are sufficiently established to have a bearing upon practice; but the practical application can be more surely and readily made if the farmer, with his inside knowledge of the way things can be done, will learn the theory than by any attempt of the scientific man striving from the outside to get up the working conditions."

The book is written as far as possible in nontechnical language, and it is assumed that the reader possesses little or no knowledge of chemistry. The main facts and principles are illustrated by numerous simple experiments. Different chapters deal with what the plant is made of, the work of the leaf, the work of the roots, changes of composition within the plant, the origin and nature of soils, cultivation and the movements of soil water, the living organisms of the soil, the chemical composition of the soil, foods, the utilization of food by the animal, food required by the growing and fattening animal, farmyard manure, artificial manures and fertilizers, and milk, butter, and cheese.

Soil improvement, P. Van Hoek and A. Rauwerda (*Dept. Landb., Nijv. en Handl., Verslag. en Meded. Dir. Landb.* [*Netherlands*], *1911, No. 1, pp. 45–53*).—This article summarizes the results of tests conducted at different places in the Netherlands in the improvement of heath soils by green manures and mineral fertilizers, the fertilizing value of sea mud, stable manure versus mineral fertilizers for sandy soils, and intensive versus ordinary methods of cultivation.

Among the conclusions it is noted that sea mud gave better results in combination with barnyard manure than with mineral fertilizers. Intensive cultivation, consisting of deeper plowing, better seed-bed preparation, and the use of larger quantities of manure, increased the yield, in some cases as much as 40 per cent.

Experiments on the effect of straw on the action of the nitrogen of green manures, K. Störmer (*Fuhling's Landw. Ztg., 60 (1911), No. 6, pp. 185–198; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 4, pp. 822, 823*).—In the series of pot and field experiments here reported on heavy and light soils the addition of straw to green manure reduced the efficiency of the nitrogen of the latter during the first year, but the results were better the second year. The use of straw alone reduced the yield, and the finer the straw the greater the reduction. Treatment during the second year with carbon bisulphid of soil to which straw had been applied nearly doubled the yield.

Cooperative fertilizer experiments with corn, cotton, rice, cauliflower, peanuts, onions, tomatoes, and potatoes, 1908–1910, G. S. Fraps (*Texas Sta. Bul. 138, pp. 5–71*).—"This bulletin contains the results of 37 cooperative fertilizer experiments on corn, 21 on cotton, 7 on rice, 1 on cauliflower, 2 on peanuts, 1 on onions, 2 on tomatoes, and 13 on potatoes, carried out . . . to ascertain the fertilizers adapted to various crops on Texas soils, under Texas conditions, and also to ascertain the relation between chemical composition, pot experiments, and needs of soil as shown by fertilizer experiments.

"Dry weather interfered to some extent with the experiments on corn. Acid phosphate at the rate of 200 lbs. per acre increased the yield in 31 of the 37 experiments. The increase averaged from 390 to 440 lbs. per acre of ear corn in the three years. Seventeen of the 37 experiments gave increases with cottonseed meal, which supplies nitrogen mostly. The average increase was greater with 120 lbs. per acre than with 60 lbs. per acre. Corn fertilized with cottonseed meal appears to suffer more quickly from drought than that fertilized with acid phosphate. Potash increased the yield in 12 of the 37 experiments. Where it was needed, it had a considerable effect on the yield. The soils which gave increased yields with cottonseed meal contain on an average less nitrogen than those which did not give increases. When less than 10 parts per million active phosphoric acid was present 2 soils gave increases with acid phosphate and 1 did not, but it is believed the sample did not represent this soil. The average yield without fertilizer on these 2 plats is 4.5 bu. per acre. The average corn possibility in pot experiments, based on phosphoric acid removed, is 4.5 bu. per acre. Six of 9 soils containing 10 to 20 parts per million of active phosphoric acid gave increases with phosphate, and the average yield without fertilizer is about 17 bu. per acre. The average corn possibility based on pot experiments is 12.5 bu. per acre, maximum 31 bu. Four soils containing 20 to 30 parts per million of active phosphoric acid all responded to phosphate, and the average yield without fertilizer was about 24 bu. per acre. The average corn possibility from pot experiments was 20.8 bu. per acre, maximum 36 bu. There was a relation between the average production of corn by the soils and the quantity of active phosphoric acid in them.

"In 17 of 21 cooperative experiments on cotton acid phosphate increased the yield. In 15 of the 21 experiments cottonseed meal increased the yield. Cotton fertilized with cottonseed meal does not suffer so much from drought as does corn fertilized with it. In 10 of the 21 experiments potash increased the yield. It would appear from these experiments that potash is more likely to be of benefit to cotton on Texas soils than to corn. The effect of Thomas phosphate on corn was less than that of acid phosphate in the 4 tests and greater on cotton in the 2 tests.

"In the experiment on cauliflower the best results were secured with an application of 300 lbs. acid phosphate per acre, 50 lbs. sulphate of potash, 250 lbs. cottonseed meal, with a top dressing of nitrate of soda, equivalent to 600 lbs. per acre of a fertilizer containing 8 per cent phosphoric acid, 5 per cent potash, and 3 per cent nitrogen, followed by the top-dressing with nitrate of soda.

"Potash was effective in 2 experiments on tomatoes. Nitrogen also was effective in one experiment.

"Lime was most effective in the production of peanuts at Rock Island, acid phosphate and potash being also effective. Acid phosphate and Thomas phosphate were most effective in the production of hay at College Station.

"One cooperative onion experiment and three other experiments on onions are reported. Potash gave no results in any of them. Phosphoric acid was most effective at Clyde; cottonseed meal was also effective. Lime was apparently most effective in one experiment at Laredo, but this soil is very rich in lime. Nitrate of soda or cottonseed meal was most effective in another experiment at Laredo. Barnyard manure was the only addition which had much effect at Beeville."

In 13 experiments with Irish potatoes acid phosphate produced results in 10 cases, cottonseed meal in all, and potash in 5. A mixture of equal parts acid phosphate and cottonseed meal, or of 800 lbs. acid phosphate to 1,200 lbs. cottonseed meal, makes a good potato fertilizer for many Texas soils. On some soils the use of potash also would be of advantage.

"In the 71 tests with corn, cotton, and potatoes 59 tests responded to acid phosphate, 45 to cottonseed meal, and 27 to potash. This confirms our conclusions from soil analyses in previous bulletins that Texas soils are likely to be deficient in phosphoric acid first of all, next in nitrogen, and last and least often in potash."

Fertilizer experiments, P. VAN HOEK and A. RAUWERDA (*Dept. Landb., Nijv. en Handel, Verslag. en Meded. Dir. Landb.* [*Netherlands*], *1911, No. 1, pp. 1-44*).—This article summarizes the results of a large number of fertilizer experiments conducted in different parts of the Netherlands to test the value of mineral fertilizers and stable manure, different nitrogenous fertilizers and the effect of seasonal influence on their action, sodium nitrate versus ammonium sulphate, potash fertilizers on clay and peat soils, phosphatic fertilizers, lime as fertilizer and as a remedy for club root of cabbage, compound fertilizers, and fertilizers for valley soils (dalgronden).

Among the more important conclusions it is stated that mineral fertilizers in general gave better results than stable manure.

With potatoes, ammonium sulphate gave the best yields on peat soils, calcium nitrate on sandy soils, and sodium nitrate on clay soils. Taken as an average for all three soils, however, the order of efficiency was ammonium sulphate, sodium nitrate, calcium nitrate, and calcium cyanamid. On sugar beets the relative efficiency was sodium nitrate 100, ammonium sulphate 99.5, calcium nitrate 99.3, and calcium cyanamid 98.1; and with grain crops sodium nitrate 100, calcium nitrate 98.1, ammonium sulphate 97.5, and calcium cyanamid 95.5.

Kainit gave better results than a so-called patent potash fertilizer. The after-effects of kainit were very pronounced. Slag was the most efficient phosphatic fertilizer on potatoes, followed in order by superphosphate, bone meal, and Algerian phosphate. Lime, when applied for several consecutive years, was very efficient in the control of club root of cabbage.

Fertilizer experiments, W. VAN DEVENTER and P. W. HOUTMAN (*Meded. Proefstat. Java-Suikerindus., 1911, No. 9, pp. 143–242*).—This article reports the results of a large number of fertilizer experiments on sugar cane conducted during 1910 at the Java sugar experiment stations to test the action of ammonium sulphate at different stages of growth of crop, and as compared with stable manure and in combination with a nitrogenous fertilizer (boengkil), superphosphate, potash applied alone and with nitrogeneous fertilizers, and organic matter, sand and stable manure on heavy soils, molasses, lime waste, green manures, and ashes.

Among the more important results obtained it is stated that heavy applications of ammonium sulphate gave better returns than lighter applications. Potash fertilizers when applied either alone or with organic matter gave little or no returns. Sand did not improve the physical condition of heavy soils; stable manure, however, gave good returns thereon.

Molasses fertilizers were very efficient on light soils.

Lime waste, which contained from 60 to 70 per cent lime carbonate, gave very good returns on both light and heavy soils. Green manures gave excellent results, more particularly on soils where the heavy applications of ammonium sulphate had little or no effect on the growth of cane. Ashes appeared to give excellent action on soils poor in phosphoric acid, although the results obtained were not conclusive.

New fertilizers, M. HOFFMANN (*Mitt. Deut. Landw. Gesell., 26 (1911), No. 28, pp. 386–389*).—This article briefly describes and discusses the fertilizing value of aluminum nitrogen, calcium nitrate, calcium cyanamid, Palmaer phosphate, Bernard phosphate, phonolite, zeolite fertilizer, and various other substances which have recently been proposed as fertilizers.

On various nitrogenous fertilizers, G. AMPOLA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 4 (1910), pp. 73–115*).—This article gives the results of chemical studies of the behavior of sodium nitrate, ammonium sulphate, calcium cyanamid, and calcium nitrate when mixed with Thomas slag and superphosphate. Results are also given of field tests as to the fertilizing effect of these nitrogenous fertilizers.

The utilization of nitrogen, F. HABER (*Verhandl. Naturw. Ver. Karlsruhe, 23 (1909–10), pp. 17–30, fig. 1*).—This article deals particularly with the author's apparatus and method for the synthesis of ammonia, but also with the efficiency of different methods of fixing nitrogen as cyanamid and nitric acid.

The fixation of atmospheric nitrogen, BONNEFOI (*Mem. Soc. Acad. Agr., Sci., Arts et Belles-Lettres Aube, 3. ser., 47 (1910), pp. 381–393*).—The processes of manufacture of calcium cyanamid and calcium nitrate are described, with a short bibliography of the subject.

Nitrification by ultraviolet rays, D. BERTHELOT and H. GAUDECHON (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 9, pp. 522–524; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 6, p. 377; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 3, pp. 528, 529*).—"Solutions were exposed, at a temperature of 35 to 50° C., for from 3 to 9 hours at a distance of 3 to 6 cm. from a lamp of 110 volts. Under these conditions the ultraviolet rays oxidized solutions of ammonia in presence of pure oxygen or of air to nitrites. Nitrates were in no case formed. Ammonium salts were also oxidized to nitrites, the reaction being slower in the cases of the sulphate and chlorid than in that of the carbonate. Urea was also converted first into ammonia and then into nitrite. Other organic nitrogen compounds, e. g., ethyl and methylamin, guanidin, hydroxylamin, acetamid, acetonitrile, etc., behaved similarly. Stress is laid on the close analogy between the effects of the rays and of enzyms. The rays are further able to convert nitrates into nitrites, and they decompose concentrated solutions of ammonium nitrite with liberation of nitrogen."

Commercial production of ammonia, C. G. TUFTS (*Jour. Indus. and Engin. Chem., 3 (1911), No. 5, pp. 295–299*).—The article describes briefly 5 methods which are commercially important in recovering ammonia from coal formations, namely, by means of the gas retort, the by-product coke oven, the Mond gas producer, distillation of shales, and blast furnaces. It is stated that by these methods the world now secures about 1,000,000 tons annually of ammonia measured as sulphate, Great Britain, Germany, and the United States producing about 80 per cent of this amount. The United States product is derived mainly from the by-product coke oven.

The article also briefly refers to the synthesis of ammonia from the nitrogen of the air.

In conclusion the author states that "the old gas retort is gradually losing ground while the output of the coke oven is increasing by leaps and bounds. Meanwhile, in the manufacture of synthetic ammonia and nitric acid, we seem standing on the threshold of a period of such chemical and electrochemical activity as the world has rarely seen."

[Production of ammonium sulphate in England] (*Chem. Trade Jour., 49 (1911), No. 1259, pp. 21, 22*).—The total production of ammonium sulphate in the United Kingdom during 1910 is stated to have been 367,587 tons. Of this amount 167,820 tons was obtained from gas works, 20,139 tons from iron works, 59,113 tons from shale works, 92,665 tons from coke-oven works, and 27,850 tons from producer-gas and carbonizing works.

Preparation of calcium cyanamid and its uses as a manurial agent (*Bul. Imp. Inst. [So. Kensington], 9 (1911), Nos. 1, pp. 44–51; 2, pp. 123–134; abs. in Amer. Fert., 35 (1911), No. 7, pp. 34–40*).—This article gives an account of the manufacture of calcium cyanamid and general information regarding its use as a fertilizer, and summarizes the results of field trials on wheat, barley, oats, corn, rice, potatoes, turnips, sugar beets, sugar cane, grasses, hemp, flax, cotton, tobacco, hops, grapes, olives, and onions.

The general conclusions are "that calcium cyanamid can either be harrowed in or applied as a top-dressing, but in most cases the former method gives the better result. The quantity applied should be between 25 and 45 lbs. of nitrogen per acre or 1 to 2 cwt. of cyanamid containing 20 per cent nitrogen. It appears to be advisable to apply the manure when the soil is wet or when there is a prospect of rain.

"As a general rule it may be stated that from the results of experiments the manurial value of calcium cyanamid is about equal to that of sulphate of ammonia when the culture is carried out on a fairly good soil, but is inferior on poor moorland or sandy soil. The beneficial effects of its application are more noticeable when applied to crops which especially need nitrogen for their successful cultivation; but on soils requiring lime as well as nitrogen, calcium cyanamid is likely to give a better return than sulphate of ammonia or nitrate of soda, especially during the second season when the effect of this lime is more noticeable than during the season of application."

Reference is made to the fact that in order to avoid trouble from dustiness a small amount of shale oil is added to the cyanamid.

Potash from feldspar, B. HERSTEIN (*Jour. Indus. and Engin. Chem., 3 (1911), No. 6, pp. 426–428*).—A process of heating finely ground feldspar in a solution of calcium chlorid with subsequent addition of limestone with a view of producing cement and potash salts is described. The process differs from that of Lawrence Smith in the direct use of calcium chlorid, thus utilizing a valueless waste product and correspondingly cheapening the process. It is estimated that 190 lbs. of potassium chlorid per ton of feldspar could be obtained by this process.

"The residue left after the potash has been removed, by aqueous extraction or otherwise, contains all the essential elements of a cement into which it could be transformed by ignition, supplementing the deficiency of calcium oxid with limestone, if required. No previous grinding would be necessary in this instance, since with the temperature kept reasonably low the mass does not clinker and disintegrate easily in water. Moreover, both the silica and the alumina of the original feldspar have been rendered extremely reactive and should therefore readily form cement on the subsequent operation."

Potash in China (*Chem. Trade Jour., 49 (1911), No. 1259, p. 20*).—Brief extracts from reports of British consuls in China are given, showing that there is no evidence of the occurrence of natural deposits of potash in that country.

The use of fine ground raw phosphate as a substitute for Thomas slag, T. Remy (*Landw. Jahrb., 40 (1911), No. 3–4, pp. 559–611*).—Comparative tests of Thomas slag and Algerian, Lahn, and Florida phosphates in field and pot experiments with grasses, grains, peas, lupines, and mustard are reported.

Except in a few cases with winter grain and lupines the raw phosphate was inferior as a fertilizer to Thomas slag. Thomas slag was from 63.8 to 76.6 per cent as effective as superphosphate, and Algerian phosphate from 5.5 to 12.8 per cent as effective. The results with Florida and Lahn phosphates were not materially different from those with the Algerian phosphate. The use of the insoluble phosphates in connection with decaying organic matter or sodium bisulphate greatly increased their efficiency.

Analysis of phosphates as a guide to their conversion into superphosphates, P. Hardy and J. Vandormael (*Bul. Soc. Chim. Belg., 25 (1911), No. 1, pp. 43–57; abs. in Bul. Imp. Inst. [So. Kensington], 9 (1911), No. 1, pp. 52, 53; Chem. Trade Jour., 48 (1911), No. 1255, p. 613*).—The authors show as a result of an elaborate study of 3 natural phosphates and of superphosphates made from them "that for industrial purposes the quantity of sulphuric acid necessary to convert a given quantity of natural phosphate into superphosphate may be calculated if the following constituents of the natural phosphate are known, viz, total lime, phosphoric acid, sulphuric acid, ferric oxid, and alumina, and in making analyses of phosphates from new sources it is sufficient for analysts to determine these constituents."

The pyrophosphates, new phosphatic fertilizers in the cultivation of sugar beets, E. Voglino (*Coltivatore, 56 (1910), No. 30, pp. 370–372; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 233*).—Experiments with 2 commercial products, one simple pyrophosphate, the other acid pyrophosphate, containing 17 and 19 per cent, respectively, of phosphoric acid soluble in dilute citric acid, are reported, the results showing that the first was inferior, the second superior, to superphosphate as regards effect upon the yield of beets. There was, however, no difference in the sugar content in the two cases.

Calcium requirements of plants and the different relations of the calcium and magnesium in nutritive solutions, N. I. Konovalov (*Landw. Vers. Stat., 74 (1911), No. 3–5, pp. 343–360; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 581, II, p. 222*).—Previously noted from another source (E. S. R., 25, p. 127).

[The lime-magnesia ratio and chlorosis of citrus fruits], C. B. Lipman and R. R. Snowden (*Pacific Rural Press, 81 (1911), Nos. 21, pp. 412, 413; 24, pp. 472, 473*).—These articles attack and defend certain conclusions drawn by R. R. Snowden in an article previously noted (E. S. R., 24, p. 525) regarding the relation of the lime-magnesia ratio and chlorosis of citrus fruits.

The value of molasses as a fertilizer, W. E. Cross (*Internat. Sugar Jour., 13 (1911), No. 148, pp. 191–196*).—Analyses showing the fertilizing value of molasses are quoted from bulletins of the Hawaiian Sugar Planters' and Louisiana stations (E. S. R., 18, p. 373; 19, p. 32), and reference is made to experiments which the author is undertaking to determine the fertilizing effect of molasses when applied to soil, especially its relation to the nitrogen content of soils.

Guano deposits of Assumption Island, Seychelles, R. Dupont (*Bul. Imp. Inst. [So. Kensington], 9 (1911), No. 1, pp. 39–44; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 12, p. 760*).—The extent, nature, and utilization of deposits of phosphatic guano on this island are discussed. It is estimated that 46,000 tons of a high-grade guano and 50,000 tons of low-grade guano are available.

AGRICULTURAL BOTANY.

Seasonal variation in the food reserves of trees, J. F. Preston and F. J. Phillips (*Forestry Quart., 9 (1911), No. 2, pp. 232–243*).—The authors present a paper in which their observations regarding the food reserves of trees are described and results of previous investigators are compared.

The work reported in the present paper and that of European investigators indicates that in the stems of all trees in temperate climates there is a reduction in the amount of starch present in autumn, the reduction in some trees being so great as to cause its complete disappearance. In a few trees a considerable increase of fat in the phloem and xylem in the late autumn or early winter is reported, but there is insufficient evidence for the belief that starch is transformed into fat. Both hard and soft wood trees were found to contain considerable fat in winter, and the authors do not agree with European writers who propose classifying hard woods as starch trees and soft woods and gymnosperms generally as fat trees. There is apparently no great increase in the content of sugar in the stems and roots, except in the spring as the buds unfold. In the root, transformations do not keep pace with those of the stem, and starch remains throughout the year, the greatest reduction occurring in the spring.

The transformations of carbohydrates are generally dependent on the season, although immediate conditions of temperature have some effect. As has been pointed out by others, the authors found that the maximum for total carbohydrate reserves of deciduous trees is at the fall of the leaf in autumn, whereas for the persistent-leaved trees the maximum is at the opening of buds in the spring.

On the chemotropism of plant roots, T. Porodko (*Jahrb. Wiss. Bot. [Pringsheim], 49 (1911), No. 3, pp. 307–388*).—After a brief review of the work of other investigators on this subject, the author describes the methods used and gives the results obtained in a series of experiments on the chemotropism of the roots of *Lupinus albus* and *Helianthus annuus* when grown in the presence of various salts in agar-agar as a diffusion medium.

The lupine roots reacted by curving, which occurred only with definite concentrations of a given salt. The upper and lower parts of the roots themselves remained straight. Only the intermediate zone showed the curved reaction, which varied in intensity, in form, and in direction according to the salt and concentration under consideration. The angle of divergence of the curvature varied between 0 and 90°, due to the action of two forces, namely, the stimuli of the salts used and gravity. The first acted on the roots in a horizontal direction, i. e., at right angles to the main axis of the root, while gravity, on the contrary, acted in a vertical direction, i. e., in the direction of the main axis of the roots. According to the relative intensity of both forces, the roots took certain position between 0 and 90°. The geotropic disposition of the roots remained constant throughout in the agar medium, so that the intensity of the curving depended only on the intensity of the diffusion forces or stimuli, and this varied with the nature of the salt or diffusion substances used, with the concentration, with the thickness of the agar block, and with the length of time the diffusing currents acted.

The form of the curving was determined by the point on the root at which the curve occurred and the appearance of the curved line. Some curves were localized near the root tips and were sharply angular, while others began in the higher zones of the root and were bow-shaped. Between these two extremes there were different transition forms.

The reaction as to the direction of the curvature, due to the concentration, manifested itself by a check in the growth and a positive curvature of the roots. This effect was observed generally in all substances tested, both electrolytic and nonelectrolytic. When the concentration became greater a difference between the reaction to electrolytic and nonelectrolytic substances manifested itself. In diffusion streams of nonelectrolytic content the roots in general were unaffected. In the case of electrolytic substances there was observed a dominant direction curve which was positive in the case of acids, alkalis, sodium carbonate, and potassium carbonate, and negative in the case of neutral salts. The differences in curvature are referred to the action of individual electrolytes. A strong positive curve was generally observed in alkaline solutions, while acids produced positive but weak curves. Positive curvatures were probably due to the presence of H and OH ions, while the negative curve seemed to depend on the strength of the solution independent of the nature of the cation. Salts with divalent cations, as magnesium and strontium, produced, independently of the nature of the anion, a negative curve. Salts with univalent cations, as lithium, sodium, potassium, and ammonium, showed less negative curvature.

The article closes with tables showing the effects of each substance used on the root curvatures and with a general discussion of the results obtained.

Researches on the formation of nitric acid in living cells, P. Mazé (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 23, pp. 1624–1627*).—The author claims that 6 species of bacteria, some aerobic and some anaerobic, form nitric acid when grown in a medium consisting of ammonium chlorid, tripotassium phosphate, magnesium sulphate, iron sulphate, sodium chlorid, calcium carbonate, saccharose, and water.

On the assimilation of atmospheric nitrogen by green plants, Eva Mameli and G. Pollacci (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), I, No. 9, pp. 680–687; Bul. Soc. Bot. Ital., 1911; No. 2, pp. 16–21; abs. in Naturw. Rundschau, 26 (1911), No. 38, pp. 484, 485*).—This is a further study (E. S. R., 24, p. 29) of the fixation of free nitrogen by green plants, in which seedlings of *Acer negundo*, *Solanum nigrum*, *Cucurbita pepo*, *Raphanus sativus*, and *Polygonum fagopyrum* were grown in sterilized nitrogen-free media. Tabulated results are given of the amount of nitrogen in each plant compared to that in the seed from which they grew.

The authors claim as a result of these experiments that under special conditions the power of assimilating free nitrogen is possessed by many green plants.

On the need of lime salts in the metabolism of the fungus Coprinus, J. R. Weir (*Flora, n. ser., 3 (1911), No. 1, pp. 87–90*).—As a result of experiments the author concludes that lime compounds are as necessary for the life and development of the higher fungi like Coprinus as for the higher algæ and other green plants.

The mechanism of carbon assimilation, III, F. L. Usher and J. H. Priestley (*Proc. Roy. Soc. [London], Ser. B, 84 (1911), No. B 569, pp. 101–112, figs. 2*).—In previous papers (E. S. R., 18, p. 540) the authors presented their conclusions on investigations relating to carbon assimilation, some of which have since been criticized. They have repeated their investigations, modifying them to some extent, and in the present paper they discuss the initial stages of the assimilation process without reference to the synthesis of sugar or starch.

The previous conclusions are modified, the authors having abandoned the idea of the exclusive localization of catalase in the chloroplasts and also the dependence of the post-mortem bleaching of chlorophyll on the presence of carbon dioxid. They believe now that they are justified in considering the primary products of the photolysis of aqueous carbon dioxid to be formaldehyde and hydrogen peroxid, and that the evolution of oxygen is due to the decomposition of the latter substance by catalase. Up to this point the process is entirely nonvital and can be readily produced artificially

The relation of the odorous constituents of certain plants to plant metabolism, F. Rabak (*Jour. Amer. Chem. Soc., 33 (1911), No. 7, pp. 1242–1247*).—In an investigation on the odorous constituents of a number of species of plants, the author has studied their relation to plant metabolism, and in general believes that the esters do not manifestly seem to be affected during the fruiting of the plant. There does, however, appear to be a period in the growth and development of plants when, with the assistance of certain favorable conditions, the chemical processes in the plant transform some of the basal constituents into esters and corresponding alcohols. The odorous constituents formed in plants are believed to be simply products of excretion formed during the metabolism of the plant and are of no further use to the plant, since they are not obviously utilized for any special purpose other than possible means of protection against insect enemies.

A research on the origin of alkaloids in plants, G. Ciamician and C. Ravenna (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), I, No. 9, pp. 614–624*).—In the experiments reported, Datura and tobacco were inoculated with certain nitrogenous and nonnitrogenous substances, and the resulting effects on the alkaloidal content were noted. The authors state that no positively definite conclusions can be drawn from their experiments, but that they indicate that the vegetable alkaloids are derived from the amido acids.

On the direct guaiacum reaction given by plant extracts, Miss M. Wheldale (*Proc. Roy. Soc. [London], Ser. B, 84 (1911), No. B 569, pp. 121–124*).—In the literature dealing with oxidizing enzyms attention is drawn to the fact that the juices of some plants change guaiacum tincture directly while others bring about a bluing only on the addition of hydrogen peroxid. Various explanations have been given to this fact, some claiming that the reduction is due to a second enzym, oxygenase. Doubt, however, has been cast on the existence of such an enzym, and the author has carried on experiments and found that the power giving rise to direct guaiacum action in any plant is always accompanied by another phenomena, i. e., the formation of brown or reddish-brown pigment when the tissues are injured mechanically or are subjected to chloroform vapor.

The author's observations have led to the conclusion that the direct action given by the extracts of plants examined is due to the presence of pyrocatechin in the tissue of the plants, which rapidly oxidizes on exposure to the air and then acts as an organic peroxid, enabling the peroxidase, which is almost universally present, to transfer oxygen to the guaiacum. The plants which the author examined and which were not found to contain pyrocatechin did not give the direct action.

Inheritance of fasciation in Zea mays, H. Hus and A. W. Murdock (*Plant World, 14* (*1911*), *No. 4, pp. 88–96, fig. 1*).—In a general discussion of the question of the inheritance of teratological characters, the author gives the results of experiments on the inheritance of fasciation of the ears of *Z. mays everta.* A comparison of the results obtained from unfasciated and from fasciated ears indicates that fasciation is not a matter of mere accident but one of inheritance, and is subject to the same laws as are other characters.

A case of gametic coupling in Pisum, P. de Vilmorin and W. Bateson (*Proc. Roy. Soc.* [*London*], *Ser. B, 84* (*1911*), *No. B 568, pp. 9–11, fig. 1*).—Observations are reported on breeding experiments with peas in which there was found a coupling of the factors of round peas and tendril bearing and wrinkled peas and nontendril bearing. The results of a series of observations on the F_4 generation showed that for the round seed 319 bore tendrils and 4 were without, while the wrinkled seed gave 3 tendriled and 123 nontendriled leaves.

On gametic coupling and repulsion in Primula sinensis, R. P. Gregory (*Proc. Roy. Soc.* [*London*], *Ser. B, 84* (*1911*), *No. B 568, pp. 12–15*).—The results are given of crossing different races of Primula, colors and length of style being contrasted.

On the microflora of soils in the vicinity of Rome, R. Perotti (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20* (*1911*), *I, No. 9, pp. 690–694*).—In a general discussion of the bacteria of these soils the author tabulates the number of bacteria per cubic centimeter of soil at depths of 10, 20, 35, and 50 cm. in tufaceous and other soils during the different months of the year, and compares the microflora of these soils.

FIELD CROPS.

Work of the Gooding substation, F. D. Farrell (*Idaho Country Life, 4* (*1911*), *No. 9, pp. 13–15, 19*).—During the duty of water investigations reported in these pages it was observed that the average weekly evaporation was 1.79 in., and the maximum and minimum 2.44 and 1.01 in., respectively. The precipitation during the growing season, or from April 1 to September 30, was 1.41 in. The principal data secured are given in the following table:

Yields of field crops secured in duty of water investigations.

Crop.	Water applied.	Yield.	Crop.	Water applied.	Yield.
	Acre-feet.	*Bushels.*		*Acre-feet.*	*Bushels.*
Turkey winter wheat	0.80	23	Lincoln spring oats	1.09	51
Do	1.10	20	Do	1.43	56
Do	1.33	29	Bluestem wheat	.78	19
White Moravian spring barley	1.00	31	Do	1.27	25
Do	1.30	37	Do	1.84	26
Do	1.87	42	Peachblow potatoes	.87	72
Lincoln spring oats	.56	40	Do	1.49	146
			Do	2.05	131

It is noted that the yield was almost directly proportional to the amount of water applied, but that a point of diminishing return was finally reached, the efficiency of the water being highest on a series of 27 plats not included in the above table when approximately 12 in. of water was applied.

Reports of the yields of various other crops are given. In a test of 32 varieties of spring wheat, all irrigated 4 times, the durum variety Pellister produced the highest yield, 40.15 bu. per acre. Among 4 barleys White Smyrna yielded 61.8 bu., and among 16 varieties of oats Big Four produced the highest yield, 91.33 bu. per acre. Among 5 clover varieties red clover yielded 8 tons of forage per acre as compared with 4.12 tons from white clover, the lowest yield. *Bromus inermis* proved remarkably resistant to cold and was 5 in. high in 1910 before any other grass in the test commenced growth. Among 9 millet varieties California produced the highest yield of forage, 5.5 tons per acre. Among the 6 sorghum varieties Red Amber produced more than 13 tons of forage per acre. Cassia Flint corn excelled 3 other varieties with a yield of about 100 bu. per acre.

Results of crop experiments, A. J. NICOLL (*Hoard's Dairyman, 42 (1911), No. 20, pp. 654, 655*).—This article reports results obtained by the president of the Delaware County Agricultural Society and manager of the experiment station work at the Delaware County Farm.

In a test of 12 varieties State Flint Yellow corn yielded 46.85 bu. per acre.

In a breeding experiment 120 potatoes of the Sir Walter Raleigh variety were selected for uniformity of size and shape. Each tuber was cut into 4 pieces. When harvested the yield from the parent tubers varied from 2 lbs. of inferior to 8 lbs. of fine, smooth potatoes. One tuber yielded 24 potatoes, 19 of which were marketable, while another tuber, apparently equally good, yielded only 12, 1 of which was marketable.

Report on harvest, season 1910–11, J. M. B. CONNOR (*Jour. Dept. Agr. Victoria, 9 (1911), No. 3, pp. 137–151, figs. 12*).—The author reports the results of field trials of the sixth year's experimental work in the northern wheat areas, with diagram of the fields for the season 1910–11.

During this year Federation wheat produced an average yield of 25.79 bu. on the 12 farms included in the test, while College Purple Straw and Yandilla King yielded 21.47 and 21.03 bu. per acre, respectively. On 10 farms higher average yields were secured from fields seeded at the rate of 65 lbs. per acre than at higher or lower rates. Among the oat varieties, Garton Stout White and Algerian produced the highest average yields, 33.29 and 32.24 bu. per acre, respectively.

Government experimental farms, 1910, A. E. V. RICHARDSON (*Jour. Dept. Agr. So. Aust., 14 (1911), No. 8, pp. 735–747, figs. 6*).—A progress report is given of 3 generations of wheat breeding work based upon crosses of selected Canadian hard reds, Indian, and Hungarian varieties on Federation, Gluyas, Yandilla King, and other local Australian wheats.

At the Loxton Experimental Farm, situated on the banks of the River Murray, Baroota Wonder and Bunyip produced the highest yields of 24 and 22 bu. per acre in a test of 9 varieties of wheat. In a test of applications to Federation wheat of superphosphate in amounts ranging from 30 to 150 lbs. per acre, the 2 highest applications, 75 and 150 lbs., were followed by exactly the same yield, this excelling that of lower rates. In a similar test with Cumberland wheat sown at the rate of 50 lbs. per acre, the highest yield, 30 bu. per acre, followed the application of 150 lbs. of superphosphate per acre, but an increase of from 22 to 27 bu. per acre followed the addition of 56 lbs. of nitrate of soda to 45 lbs. superphosphate and 30 lbs. of sulphate of potash. Both mixtures were followed by a slightly lower yield than was secured with 45 lbs. of superphosphate alone. In a cultivation test wheat receiving no cultivation other than a slight stirring incident to drilling produced almost as much grain as that planted on ground that was cultivated during the preceding fall. Yields about 4 bu. higher were secured on ground plowed 3 to 4 in. deep.

In a test of 4 varieties of oats, Scotch Grey produced the highest yield, 18 bu. and 30 lbs. In a test of 4 wheat varieties Cumberland and King Red produced about 15 bu. each. In a test of 14 other wheat varieties Gluyas produced the highest yield, 28 bu. per acre.

Report of Hedemarken county experiment station, 1910, W. CHRISTIE (*Ber. Hedemarkens Amts Forsöksstat. Virks., 6 (1910), pp. 58, pls. 3, figs. 5*).—The author reports the results of tests conducted during 1907–1910 of different dates for planting potatoes, of work conducted in 1910 on the starch content of potatoes, of storing potatoes, and of work with oats in 1909 and 1910.

In the potato storage tests 2 piles of the General Cronje variety were made 1½ meters wide by 3 meters long and as high as they would lie, none being placed beneath the soil surface. Two other piles were placed in trenches ½ meter deep, ½ meter wide, and 3 meters long, and piled as high above the ground as they would lie. All were covered with 2 layers of straw alternating with 2 layers of dirt. In the 2 large piles were stored 1,352 and 1,293 kg. of potatoes, respectively, and in the smaller ones 632 and 611 kg. The larger piles were ventilated at the surface of the ground and at the top of the pile, the smaller ones being ventilated only at the top. The storage period extended from November 1, 1908, to April 20, 1909. The temperature readings presented for 10-day intervals showed a minimum for the period of −23.9° C.

On opening the piles only a few potatoes in the top layer were frozen, but bacterial rot had spoiled considerable quantities, apparently because of the moist condition of the potatoes when stored. In the large piles 43 per cent of the tubers were sound as compared with 54 per cent in the small piles. In view of the difficulty of getting the potatoes into storage sufficiently dry in the fall, the author does not recommend the method tested but prefers the use of potato cellars, the average expense of which he estimates at 1 krone per 100 kg. of potatoes (12.2 cts. per 100 lbs).

A comparison of strains of pure-bred Norwegian gray oats, white oats, and Probsteier oats showed that the 3-kernel characteristic increases with the number of whorls, but comparisons of different strains of the same variety failed to show that these characteristics stand in either a direct or an indirect relation to one another. The 3-kernel characteristic likewise increased with the kernel weight per plant when comparison was made within the same pure-bred strains, but no regularity was traceable between different strains of the same variety. The author, therefore, considers the 3-kernel characteristic one that gives information concerning the luxuriance of the individual plant only, and not of the productiveness of the strain, so that he regards the characteristic as of no value in making comparisons between strains within the same variety. The kernel weight per plant gives much more certain information as to the yield of the strains and may furthermore be determined considerably more easily and more rapidly.

Alfalfa in northwest Texas, A. B. CONNER (*Texas Sta. Bul. 137, pp. 17, pl. 1, fig. 1*).—These directions for producing alfalfa in northwest Texas and utilizing it for hay, seed, and forage are based on farm experience in that region and 5 years' experimental work by this Department and the Texas Station in cooperation.

The improvement of the Proskowetz-Original-Pedigree barley, E. VON TSCHERMAK (*Wiener Landw. Ztg., 60 (1910), No. 11, pp. 98, 99; abs. in Jour. Landw., 58 (1910), No. 2, p. 137*).—Since 1904 the author has grown Hanna barley, a local variety, the value of which was first recognized by von Proskowetz. An increase in tillering power, fineness of hull, and early maturity by selection, spontaneous crossing, and by open blossom was observed.

Red clover, J. M. WESTGATE and F. H. HILLMAN (*U. S. Dept. Agr., Farmers' Bul. 455, pp. 48, figs. 25*).—It is thought that the data here summarized "will enable farmers in the clover-producing States to continue the growth of this crop with more certainty of success than is at present the case in many sections."

A description of the plant and statements of its history, distribution, and soil and climatic requirements are followed by discussions of the following topics: Obtaining a stand, handling the crop, red clover in mixtures and in rotations, red clover as a feed and a soil improver, seed production, varieties, insect enemies (by F. M. Webster), fungus diseases, and clover sickness.

Inheritance of row-numbers in maize ears, J. BURTT-DAVY (*Nature* [*London*], *86* (*1911*), *No. 2167, pp. 347, 348*).—The Arcadia White Sugar maize is the result of a cross between the 8-rowed Black Mexican and a white flour-corn which normally bears a large number of rows. Thirty-three plants of Arcadia bearing 2 well-developed ears each were studied with special reference to the number or rows. In 12 plants the lower ear had as many rows as the upper ear, in 13 cases it had more, and in 8 cases fewer. Among the 66 ears 11 were 8-rowed, 23 10-rowed, 30 12-rowed, and 2 14-rowed.

Maize from Nyasaland and the Gambia (*Bul. Imp. Inst.* [*So. Kensington*], *8* (*1910*), *No. 4, pp. 369, 370*).—These pages report the results of the examination and valuation of white and yellow maize samples submitted by the director of agriculture at Zomba and described as grown in the Port Herald district.

The shrinkage of corn in storage, J. W. T. DUVEL and L. DUVAL (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 81, pp. 11, figs. 3*).—This is a statement of observations made on 500 bu. (28,000 lbs.) of shelled corn stored in the wooden hopper of a scale in a Baltimore elevator. The corn remained in the hopper from January 5, 1910, until May 14, 1910, without handling "It was then run out of the hopper and elevated 3 times to the same scale," and laid 18 days longer, making 147 days in all in storage.

On January 5 the average moisture content of the corn was 18.8 per cent. Its temperature and that of the air were 20° F., its germination test 89.6 per cent, and its weight per bushel 54.7 lbs., while 97.1 per cent of the corn was sound. On June 1 the moisture content was 14.7 per cent, the weight per bushel 50 lbs., the germination test 1 per cent, and only 1.1 per cent of the corn was sound. The total shrinkage during the storage period of 147 days, exclusive of the loss of 448 lbs. during the 3 elevations, was 1,522 lbs., or approximately 5.6 per cent.

It was observed "that whenever there was an increase in weight or a retardation in the shrinkage the relative humidity of the atmosphere was very high between weighings, and in most cases a heavy rainfall occurred just before such weighings were made." The shrinkage in weight from January 5 to April 21, while the corn remained in good condition, was approximately four-tenths of 1 per cent, but from April 21 to May 14, during which time the corn became sour and hot, with a maximum temperature of 138° F. on May 2, the shrinkage was approximately 2.6 per cent. During the 3 elevations on May 14, on a basis of the actual weight of corn in the hopper just before handling, the shrinkage was 1.65 per cent. After the corn had been cooled to 55° F. by handling, the shrinkage in storage from May 14 to June 1 was 2.6 per cent. So long as the corn remained in good condition its rate of shrinkage was largely influenced by the relative humidity, air temperature, and other weather conditions.

The problem of the improvement of cotton in the United Provinces of Agra and Oudh, H. M. LEAKE and A. E. PARR (*Agr. Jour. India, 6* (*1911*), *No. 1, pp. 1–13, pls. 5*).—A review of the problems involved in cotton improvement in Agra and Oudh is followed by a discussion of progress already made.

The authors have shown that the cotton grown throughout the provinces consists of a mixture of types. The flowers are of 3 colors due to 2 color characters, yellow and red. "When both colors are present the flower has the full red color; when red is present and yellow is absent the flower is pink, while if yellow is present and the red absent the flower is yellow."

The plant sought by the authors in their work must be ripening fruit by the beginning of October if sown at the beginning of the rains, thus having a vegetative period of from 70 to 80 days. It must flower early and be a vigorous heavy yielder, with a fine, long, silky lint. A red flower is an important although secondary requirement, as it is an easily detected feature and aids in disclosing the mixture of impure strains. Crosses between Nurma and a short, staple, silky Bani, and between Nurma and a white-flowered Desi have been relied on for practical results in earlier experiments which are discussed.

Suggestions for cotton growers, R. H. B. DICKSON (*Rhodesia Agr. Jour., 8 (1911), No. 4, pp. 563–583, pl. 1*).—A brief review of the world's cotton supply and demand is followed by itemized statements of the cost of producing and marketing the crop in the Transvaal, and an itemized statement of the average cost per acre on 3,325 plantations in the southern part of the United States. The total cost per acre given is £3 4s. 6d.

Cotton cultivation: Prospects in Transvaal, T. A. J. PLACE (*Agr. Jour. Union So. Africa, 1 (1911), No. 1, pp. 58–64, pls. 2*).—The author presents estimates of the cost of production and the returns per acre of cotton, indicating a profit of £4 8s. per acre. He states that at the Barberton experiment station Doughty Big Boll, Black Rattler, and Cook Long Staple yielded 1,292, 1,272, and 1,224 lbs. of seed cotton per acre, respectively, while at the Tzaneen station in the Zoutpansberg district equally satisfactory results have been obtained.

Cotton growing in German East Africa, L. HAMILTON (*United Empire [Gt. Brit.], n. ser., 2 (1911), No. 6, pp. 410–415, map 1*).—This is a discussion of the possibilities of avoiding the "American cotton monopoly" by the development of cotton growing in German colonies.

Some problems connected with the introduction and cultivation of exotic cottons in Nyasaland, J. S. J. MCCALL (*Nyasaland Dept. Agr. Bul. 1, 1911, pp. 8*).—A statement of the climate, insect pests, and other local conditions with special reference to cotton growing in Nyasaland accompany suggestions on the choice of seed.

Field pea production in Washington, M. W. EVANS (*Washington Sta. Bul. 99, pp. 4–22, figs. 4*).—In this report of investigations in cooperation with the Bureau of Plant Industry of this Department, statements of some cultural and other characteristics of 6 varieties are followed by directions for growing, harvesting, thrashing, and utilizing field peas in Washington.

In a rate of seeding test conducted during the very dry summer of 1910 the maximum yield of Kaiser followed seeding at the rate of 127 lbs. per acre, but in case of Bangalia 73 lbs. appeared to be the best rate.

Rice, J. KENNY (In *The Coconut and Rice. Madras, 1910, pp. 25–58*).—In a test of 7 different fertilizer mixtures applied at various rates applications of (1) 6 maunds (493 lbs.) of bone meal, (2) 3 maunds of bone meal, and (3) 100 maunds of cow dung were followed by yields of 3,962, 3,663, and 3,556 lbs. of grain per acre. These were 12-year averages for the period ended in 1908. Tables state the results of other fertilizer tests with rice.

Sisal hemp in Fiji, C. H. KNOWLES (*Dept. Agr. Fiji Bul. 1, 1911, pp. 16, pls. 2*).—Directions for growing and harvesting the crop and for extracting the fiber are followed by statements of results obtained at the experiment station.

The best two sweet sorghums for forage, A. B. CONNER (*U. S. Dept. Agr., Farmers' Bul. 458, pp. 23, figs. 7*).—The author regards Amber as the best sorghum in the section north of the central line of Kansas and Missouri, and Sumac south of it. In a test of 8 sorghum varieties conducted in northwestern Texas the growing periods ranged from 92 days in case of Red Amber to a maximum of 120 in case of Gooseneck, while the yield ranged from 4 tons in case of Minnesota Amber to 7½ tons each in case of Sumac, Gooseneck, and Honey. The number of leaves, degree of sweetness, juiciness, and tenderness, and the principal objections are stated in connection with each variety.

Descriptions of the varieties tested are followed by discussions of the factors limiting sorghum growth; means of securing the best forage yields; sorghum-cowpea mixtures; growing pure and improved seed; and harvesting, curing, storing, feeding, and marketing the crop.

The Eckendorf breeding standard, SCHMELZER (*Illus. Landw. Ztg., 30 (1910), No. 1, p. 2, fig. 1; abs. in Jour. Landw., 58 (1910), No. 2, p. 134*).—The author calls attention to the fact that von Vogelsang has established a model for the Eckendorf type which can readily be adapted to other beet types. It provides for the designation of the size and form of the beet by means of 7 figures.

Yields of sugar canes: Crops of 1910, J. B. HARRISON and F. A. STOCKDALE (*Jour. Bd. Agr. Brit. Guiana, 4 (1911), No. 4, pp. 210–212*).—These pages report data from plantation reports, showing the acreage devoted to each of a number of cane varieties as well as the yield secured.

Cultivation of tobacco in the Philippine Islands, B. E. BREWER (*Philippine Bur. Agr. Farmers' Bul. 16, 1910, pp. 23, pls. 3, figs. 3*).—A brief handbook of information for the tobacco grower in the Philippine Islands.

Winter wheat in western South Dakota, C. SALMON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 79, pp. 10*).—This paper deals with the advantages of, and difficulties likely to be encountered in, growing winter wheat in the semiarid section of western South Dakota.

In a 3-years' test at the Bellefourche experiment farm the average winter killing of the best varieties was less than 15 per cent. Three-years' variety tests showed no varieties superior to the Russian winter wheats Kharkof and Turkey. The author considers summer fallowing the best method of preparing the seed bed, although this is likely to increase the danger from soil blowing. Data are given concerning a 3-years' experiment to ascertain the best time of seeding winter wheats but the results obtained were not uniform. The author recommends early sowing at the rate of 3 pk. per acre if the seed bed is well prepared and there is sufficient moisture to germinate the grain.

A new English wheat variety, H. FABER (*Tidsskr. Landokonomi, 1911, No. 4, pp. 237–244*).—The history and special characteristics of the wheat variety Burgoyne Fife are discussed.

Work done under the seed control act, H. L. BOLLEY (*North Dakota Sta. Rpt. 1909, pp. 67–93,, figs. 2*).—During the six months ended December 31, 1909, the seed laboratory received 10 miscellaneous samples for identification, 302 samples of field seeds for purity or germination tests, and 131 samples of garden seeds and 277 samples of flower seeds for germination tests, the results of which are summarized. An enumeration is also given of the principal weed seeds found in the field seeds. The methods of examination are briefly described.

Experiments conducted during the year with the so-called "hard" seeds of legumes indicate that such seeds will not when planted germinate sufficiently quickly to be of any advantage to the farmer. Tests with "hard" clover seed treated with hot water at a temperature of 80° C. for 1, 2, and 4 minutes, at 90° for 1 minute, and with 0.1 of one per cent caustic potash solution for 1 hour, also at 80° C. for 1 and 2 minutes, and 70° C for 1 minute, showed that neither the untreated seed nor any one of the treated samples succeeded in producing as many plants in the field as the sample produced sprouts in germination tests. The highest percentage of field growth was 61.7 per cent, while the average of 40 tests in the laboratory showed 77 per cent.

Evidence is submitted controverting the contention of seedsmen that alfalfa dodder does not mature seed in the Northwest.

Work with weeds, H. L. BOLLEY (*North Dakota Sta. Rpt. 1909, pp. 56, 57*).—Attempts to procure a substance destructive to quack grass and sow thistle without being injurious to the soil have as yet been essentially negative. As a chemical of cheap grade which would be destructive to dandelions and noninjurious to grasses, stone walks, clothing, etc., calcium chlorid has been used with considerable success, though not as yet recommended as a substitute for iron sulphate.

The extensive field trials with iron sulphate against dandelions previously noted (E. S. R., 19, p. 56) were continued. It is concluded that this treatment is quite practical on large lawns, and that the cost, using field sprayers, is less than that for mowing such lawns.

The beneficial effect of the iron sulphate in preventing diseases of blue grass was again noted.

Weeds of the farm and garden, L. H. PAMMEL (*New York and London, 1911, pp. XI+281, pl. 1, figs. 174*).—The author presents a partial bibliography, consisting of easily accessible references, and devotes particular attention to descriptions of some common weeds. He deals with many more forms from eastern North America than from the Pacific coast or the Southern States, and presents numerous new drawings. Special chapters are devoted to the nature of the crop injury due to weeds, a classification of weeds based on duration, the dispersal of weed seeds, seed testing to detect impurities, weed laws and seed-control laws, weeds of special crops, poisonous and noxious weeds, migration, extermination, and morphology of weeds, and treatment for special weeds.

HORTICULTURE.

A new method of shortening the rest period of woody plants, F. JESENKO (*Ber. Deut. Bot. Gesell., 29 (1911), No. 5, pp. 273–284, pl. 1; abs. in Gard. Chron., 3. ser., 50 (1911), No. 1286, p. 131*).—The method of forcing plants recently experimented with by the author consists in injecting into the stems dilute solutions of alcohol or of ether, and likewise of water. The injection fluid is contained in a vessel and subjected to a pressure of about one atmosphere, side tubes connecting the vessel with the branches to be forced. Solutions of different strengths were used.

Tests conducted in December with the common lilac, Forsythia, and the flowering plum gave negative results. In January, however, the branches of a number of trees were successfully forced both with alcohol and with ether as well as with the water injection. With the black locust, for example, it was shown that a 5 per cent solution of alcohol, or 0.1 per cent ether solution, injected into cut branches caused the buds to expand about 3 weeks earlier than untreated branches. A number of consecutive tests with black-locust branches indicate that the treatment is only effective in stimulating the buds during the rest period. The failure to stimulate the buds of the above-named shrubs is attributed to the fact that these shrubs had practically passed through their rest period and were only awaiting favorable weather conditions, such as may be obtained in the greenhouse, to start growing.

A number of hornbeam branches were taken from the woods and treated in February. The treated buds from branches growing on the periphery of the tree developed much quicker than the control buds, whereas the treated buds on branches taken from the undergrowth were much slower in development than the control buds.

The general conclusion is reached that certain concentrations of alcohol and of ether as well as pure water exert a beneficial influence in forcing plants. For alcohol the concentration may range from 1 to 10 per cent and for ether from 1 to 0.01 per cent. The use of these injections subsequent to the rest period, however, may result in injury, if not in death, to the branches.

A brief bibliography is appended.

The wounding method: A new process of forcing plants, F. Weber (*Österr. Gart. Ztg., 6 (1911), No. 7, pp. 241–245, figs. 2*).—The method described consists in piercing the individual buds of the plants to be forced with an ordinary medium-sized needle. The incision is made at the base of the bud and the needle point is allowed to penetrate to the center of the bud.

The development of linden buds which were pierced in this manner during the after-rest period, or about the end of January, was from 2 to 3 weeks earlier than that of the unpierced buds. Lilac and linden buds pierced in this manner were also given an injection of water, the resulting development being quicker and stronger than piercing with the needle alone. The water injection acted less favorably with beech and maple. Thus far the experiments have not been sufficient to determine the practicability of this method with the ordinary forcing plants.

Report of the government horticultural experimental fields in South Holland for 1910, C. H. Claassen et al. (*Verslag Rijkstuinbouwproefvelden Zuid-Holland, 1910, pp. VII+80*).—Results are given of a large number of coöperative cultural, variety, fertilizer, and spraying experiments with fruits and vegetables, conducted at different localities in South Holland during 1910.

Important orchard pests and spray formulas with general outlines for spraying of apple and peach orchards, B. D. Van Buren and P. L. Huested (*N. Y. Dept. Agr. Bul. 24, 1911, pp. 477–491*).—Popular directions are given for treating the principal fungus diseases and pests of the apple and peach.

The control of insects and diseases affecting horticultural crops, H. R. Fulton, W. J. Wright, and J. W. Gregg (*Pennsylvania Sta. Bul. 110, pp. 3–44*).—This bulletin contains concise descriptions of the principal insect enemies and fungus diseases of fruits and vegetables, and suggests methods for controlling them. Most of the remedies suggested have been verified by trials at the station.

Presence of arsenic in fruit sprayed with arsenate of lead, P. J. O'Gara (*Science, n. ser., 33 (1911), No. 858, pp. 900, 901*).—The author points out that many brands of arsenate of lead used for spraying fruit do not show sufficient uniformity in arsenic content, nor is the arsenic found in the proper combination with lead. Upon examination of a number of apples held in storage which had developed red and black spots, it was found that such fruits contained arsenic, and that the badly spotted fruits showed about twice as much arsenic as unspotted fruits from the same lot. A 10-gm. sample of badly spotted apple skin showed 0.05 mg. of metallic arsenic. One large Spitzenburg apple showed a total of 0.3 mg. of arsenic calculated as AS_2O_3.

It was also noted that certain papers used for wrapping apples and pears very frequently contain small amounts of arsenic, as well as other substances, which may or may not have an injurious effect. In one case under observation a shipment of pears of one variety from the same orchard was wrapped in 2 different brands of paper. An examination of the whole shipment after it had been in storage for some time showed that the condition of the fruit corresponded exactly with the brand of paper used, the ripening process of one lot being much in advance of the other.

The principles of pruning, E. LUCAS (*Die Lehre vom Baumschnitt für die deutschen Gärten bearbeitet. Stuttgart, 1909, 8. ed., rev. and enl., pp. XVI+334, pls. 8, figs. 256*).—A practical guide to the pruning and training of fruit trees, vines, and bushes, with special reference to German conditions. Consideration is also given to the pot culture of fruit trees and protection of fruit against weather conditions, insects, etc., and harvesting and storing fruit.

Fruit tree planting, C. B. WALDRON (*North Dakota Sta. Rpt. 1909, p. 95*).—All of the young fruit trees in the station plantation were killed by hail in 1908 and were replaced with standard varieties of apples and plums considered suitable for the climate. The rapid spread of the Exoascus or so-called "plum pocket" is considered a very serious menace to plum growing and will necessitate the selection of resistant strains.

Progress in the breeding of hardy apples for the Canadian Northwest, W. SAUNDERS (*Canada Cent. Expt. Farm Bul. 68, 1911, pp. 14, pls. 3*).—The author has been engaged for the past 24 years in an attempt to breed a hardy race of apples for the Canadian Northwest. This bulletin reviews the history of this investigation and gives the results thus far secured.

The first plantings were made in 1887 from seeds of *Pyrus baccata*, obtained from the Royal Botanic Gardens, St. Petersburg, Russia. In 1894 *P. baccata* was crossed with pollen from many of the hardiest and best sorts of apples grown in Ontario. Other species were subsequently used in the breeding investigations. The crosses herein described include 17 crosses of *P. baccata* with some of the best cultivated apples, together with 13 additional and less desirable crosses with *P. baccata*, 10 crosses with *P. prunifolia* with some of the best cultivated apples, and a cross of *P. prunifolia intermedia* with McIntosh Red. Within recent years crosses of *P. baccata conocarpa* and *P. baccata sanguinea* with cultivated varieties have also been made. A list is given of second crosses now in the orchards on the Central Experimental Farm, Ottawa, and 2 of the most promising of these, Margery and Martin, are herein described as well as the 3 following crosses which gave promise of unusual hardiness: Rideau, a cross of Wealthy with Duchess; Fairfield, a cross of Hyslop Crab with Duchess; and Salmon, a cross of Duchess and Anis.

Judging from the results thus far secured the author is of the opinion that in a very few years a number of varieties of apples will be available, possessing the requisite hardiness, size, and quality for culture in all those portions of the northern country where ordinary apples can not be grown.

Is it necessary to fertilize an apple orchard? U. P. HEDRICK (*New York State Sta. Bul. 339, pp. 153–195, pls. 4, figs. 7*).—This bulletin contains a detailed account of a 15-year experiment to determine whether it is necessary to fertilize apple orchards.

The experiment was carried on in a station orchard composed of Rome Beauty apples top worked on Ben Davis and set out in 1896. The soil is a clay loam, too heavy for a good orchard soil and not better than the average clay soil in the farm lands of western New York. The orchard has been given the care as to tillage, pruning, spraying, etc., that it would receive in a commercial plantation. Beginning with 1900, 2 plats of 5 trees each have received an average of 415.15 lbs. of stable manure per tree; 2 plats an average of 12.66 lbs. of P_2O_5 per tree; 2 plats an average of 7.26 lbs. muriate of potash and 12.6 lbs. acid phosphate per tree; and 2 plats an average of 7.26 lbs. of muriate of potash, 12.6 lbs. acid phosphate, 3.67 lbs. nitrate of soda, and 12.84 lbs. dried blood per tree. The fertilizers were applied as soon as the ground could be tilled in the spring, and they were only applied underneath the branches of the trees, so that a tremendous excess of each has been used. The results, which are presented in tabular form and fully discussed, were gauged by the yield, size, color, flavor, maturity, and keeping quality of the fruit; the diameter of the tree; the amount, color, and weight of foliage; and the length and weight, as well as the annual growth of the branches.

As compared with the checks the fertilizers had no sensible effects upon the yield of fruit. Data secured in 1910 indicate that the size of the apples is possibly increased by the fertilizers, since the percentage of culls and seconds is a trifle higher in the check plats. The several current generalizations as to the effects of fertilizers on apples were not verified in this experiment. No change was noted in the color of the fruit, and all of the trees in the several plats have borne crops very uniform in maturity, keeping quality, texture, and flavor of apples. The diameter of the trees differed only within the range of variation in the several plats. In the nitrogen plats the foliage during the last season was greener than in other plats, and there was also a measurable effect of the nitrogen in the weight of the leaves. There is slight evidence that the trees on the nitrogen plats are making a greater annual growth of branches.

No detrimental influence attributed to the excessive amounts of fertilizers used is indicated.

An analysis of the soil made before the experiment was begun and here presented shows that at that time there was in the upper foot of soil enough nitrogen per acre to last mature apple trees 183 years, phosphoric acid for 295 years, and potash for 713 years. The conclusion is reached that tillage, cover crops, and good care have made available from this well-nigh inexhaustible supply all the plant food these trees needed. The author points out that whereas it may be necessary to fertilize some apple orchards in New York, such cases will be found on sandy and gravelly soils, on lands very subject to drought, on very shallow soils, and on soils quite devoid of humus. It is believed, however, that only a few of these soils will need a complete fertilizer.

As to the practical outcome of the experiment, it is pointed out to the fruit grower that his trees do not need fertilizers if they are vigorous and making a fair amount of new wood. If the trees are not vigorous, drainage, tillage, and the sanitary conditions should be looked to first and the fertilization afterwards if then found necessary. A plan is submitted for a fruit-grower's fertilizer experiment.

Does the apple orchard need fertilizers? F. H. HALL (*New York State Sta. Bul. 339, popular ed., pp. 12*).—A popular edition of the above.

The packing of apples in boxes, C. S. WILSON (*New York Cornell Sta. Bul. 298, pp. 681–693, figs. 10*).—The use of the box package, so generally employed in packing and marketing western apples, is beginning in the East, and the aim of the present bulletin is to give such information as will enable the eastern growers to use the box pack more extensively. It discusses the box and box material, lining, layer and wrapping paper, the packing table, the box press, packing, and varieties suitable for packing in box or barrel. A plan and detailed specifications are given for the use and construction of a box press.

Utilization of the citrus fruits (*Indian Agr., 36 (1911), No. 7, pp. 204–206*).—In this article the general and fundamental principles underlying the manufacture of oils and essences from citrus fruits in Italy and France are given.

The culture and curing of vanilla in Mexico and in other countries, including suggestions for improving the industry, R. LOPEZ Y PARRA (*La Vainilla su Cultivo y Beneficio en la Republica Mexicana y en el Extranjero y Algunas Consideraciones Sobre el Perfeccionamiento de Este Rico Producto Agricola. Mexico: Govt., 1911, pp. 78, pls. 5*).—Part 1 of this pamphlet discusses the culture and curing of vanilla in Mexico, and part 2 deals with methods employed in other countries. Part 3 contains general considerations relative to the improvement of native methods of culture and curing.

Sweet pea studies, J. CRAIG and A. C. BEAL (*New York Cornell Sta. Bul. 301, pp. 749–764, pl. 1, fig. 1*).—This comprises the results of field and forcing tests of sweet peas conducted cooperatively in 1909–10 by the Cornell Station and the National Sweet Pea Society of America. In the field tests 469 different varieties of *Lathyrus odoratus* from various sources were studied, together with a number of allied species and genera. The forcing tests conducted under glass for 2 seasons included 75 winter-flowering varieties. The majority of the varieties received for advance trial as well as those introduced in 1909 and in 1910 were true to type, although a number of unfixed or mixed stocks were noted. A list is given of the commended and highly commended varieties.

Autumn plantings of 3 varieties were compared with spring plantings of the same varieties. Starting with October 20, 1909, 5 successive plantings 10 days apart were made. Eight spring plantings were made from March 12 until the end of May. Four to 48 per cent of Mont Blanc, 5 to 82 per cent of King Edward, and 20 to 81 per cent of Countess Spencer came through the winter. The first 2 varieties gave the best results from the planting of November 10, and Countess Spencer did best from the earlier plantings. Plantings made either in fall or spring, when the surface of the ground was frozen, gave a low percentage of germination. The first 3 fall plantings of Mont Blanc came into bloom June 6 and the last on June 20 The fall plantings bloomed 2 weeks before the regular spring plantings of the same variety. Dry, hot weather brought all of the April plantings into bloom at the same time, the earlier plantings producing taller plants. On the later plantings the amount of bloom and length of stem was much reduced. The results indicate that white-seeded sweet peas should not be planted until the ground is warm, and that planting of the garden varieties after May 10 is hardly worth the trouble.

In the forcing tests varieties of the 3 winter-flowering groups, winter or Christmas flowering, Telemly, and the Engelmann group (*Lathyrus odoratus praecox*) were studied. A brief historical sketch of these groups is given. Only one variety tested proved to belong to the outdoor type. As to time of flowering the winter-flowering sweet peas were divided into 2 groups, the extra early flowering and the winter-flowering proper. The first group blooms about 3 weeks earlier but has smaller flowers and shorter stems than the latter. The varieties of the true winter-flowering group are crosses between some of the extra early group and the garden varieties of sweet peas. When studied along with 5 species of vetch (Vicia) no hybrid suspect between the vetch and *Lathyrus odoratus* was observed. The forcing varieties are classified according to color and discussed. A summary is also given of the leading varieties classified by color.

Our ornamental plants, P. F. F. SCHULZ (*Unsere Zierpflanzen. Leipsic, 1909, pp. VIII+216, pls. 14, figs. 104*).—The author here presents popular biological studies of a number of park, garden, and indoor ornamental plants, selected from the principal groups of the plant kingdom, including cryptogams, conifers, monocotyledons, and dicotyledons.

FORESTRY.

Light in relation to tree growth, R. ZON and H. S. GRAVES (*U. S. Dept. Agr., Forest Serv. Bul. 92, pp. 59, figs. 10*).—The aim of this bulletin is to bring together the principal facts relative to the part which light plays in the life of the forest and the different methods of measuring it. It is hoped that it may stimulate an interest to further research to determine more accurately the light requirements of our forest trees, especially by actual measurements of light in the forest.

The subject is discussed under the following general headings: Kinds of light, light intensities and tree growth, tolerance and intolerance of trees, factors influencing tolerance, measure of tolerance, methods of determining tolerance, and relative value of different methods.

A bibliography of the subject is appended.

[Forest plantations], C. B. WALDRON (*North Dakota Sta. Rpt. 1909, pp. 94, 95*).—Among the deciduous trees in the different tree plantations of the station, the green and white ash, soft maple, hackberry, black walnut, and white birch made the most satisfactory growth. The catalpa has been discarded as wholly unsuited to the climate. The Norway maple seems to be too tender for general planting. The insect enemies of the cottonwood and Norway and Carolina poplars are increasing so as to discourage the general planting of these trees. Considerable difficulty is being experienced in establishing young coniferous trees.

[Report on forest plantings], C. B. WALDRON (*North Dakota Sta. Rpt. 1910, pp. 49, 51*).—Brief notes are given relative to the behavior of a number of different species of trees as influenced by freezing and drought.

Uses of commercial woods of the United States.—I, Cedars, cypresses, and sequoias, W. L. HALL and H. MAXWELL (*U. S. Dept. Agr., Forest Serv. Bul. 95, pp. 62*).—This is the first of a series of bulletins in which the aim will be to bring together in convenient form the available information on the uses of the different commercial woods. It is believed that the series will be of especial interest to lumbermen, those engaged in the wood-using industries, and foresters, as well as to instructors and students in forest schools.

The above species are considered separately, authentic information relative to the physical properties of each species being first presented, after which notes are given on the uses made of each wood from the earliest time, together with a discussion of their various uses at the present time. In addition to original data collected by the Forest Service, the subject matter has been gathered from many and widely scattered sources.

California tanbark oak (*U. S. Dept. Agr., Forest Serv. Bul. 75, pp. 34, pls. 10*).—The purpose of this bulletin is to show how the wood of the tanbark oak, which is now left in the forest to rot unused or to add fuel to forest fires, may be utilized and that a careful handling of the woodlands, coupled with conservative lumbering, ought to make the tanbark oak crop continuous and render this resource inexhaustible.

The bulletin consists of 3 portions. Part 1, Tanbark Oak and the Tanning Industry, by W. L. Jepson (pp. 5-23), discusses the development of the tanning industry in California, the silvical characteristics of the tanbark oak, the production of tanbark, the quality of the bark, prolonging the supply, tannin-extract process, and possibilities of utilizing the wood. Part 2, Utilization of the Wood of Tanbark Oak, by H. S. Betts (pp. 24-32), comprises results of tests relative to the strength, seasoning, and shrinkage qualities of tanbark oak, deals briefly with the various hardwoods used on the Coast, and suggests uses for tanbark oak. The appendix, Distribution of Tannin in Tanbark Oak, by C. D. Mell (pp. 33, 34), contains a table indicating the location of tannin in the elements of pith, wood, and bark of a number of trees, together with brief directions for determining the distribution of tannin in plant tissues.

An investigation of the tannin content shows that tannin is present in the twigs of tanbark oak as well as in the older bark and that tanning extract could be made from the twigs and smaller branches, as in the case of the eastern chestnut (*Castanea dentata*). There is but little tannin in the wood-parenchyma elements of the heartwood, however, so that the tannin extract can not be got by chipping the wood and subjecting it to tanning-extract processes. Results of the timber test indicate that there is no good reason why tanbark oak should not be used in the Pacific Coast region for many, if not all, purposes for which eastern hardwoods are now imported. A commercial trial of this native oak as a substitute for eastern lumber is recommended.

"Colombian mahogany" (Cariniana pyriformis) (*U. S. Dept Agr., Forest Serv. Circ. 185, pp. 16, figs. 11*).—The purpose of this circular is to present to users of cabinet woods the distinguishing characteristics of one of the best imitation mahoganies now marketed. Its characteristics and its use as a substitute for true mahogany (*Swietenia mahagoni*) are described by G. B. Sudworth and C. D. Mell, and a description of its botanical characters is given by H. Pittier.

The authors are of the opinion that although Cariniana differs widely in its botanical and anatomical characters from true mahogany, its close superficial resemblance to mahogany and its physical properties at once distinguish it as a high-class cabinet wood, and there is no reason why it should not be employed under its own name for all purposes for which true mahogany is used.

Scrub pine (Pinus virginiana), W. D. STERRETT (*U. S. Dept. Agr., Forest Serv. Bul. 94, pp. 27, pl. 1*).—In this bulletin the scrub pine is discussed relative to its nomenclature, distinguishing characteristics, distribution and occurrence, form and development, reproduction, enemies, characteristics of the wood, uses and market, advisability of forest management, purposes of management and rotation, sustained annual yield, new crops by natural reproduction, improvement thinnings, protection, extension, and the prevention of extension.

It is believed that this species, which is especially adapted to sterile soils and worn-out farm land, offers an important problem of wood-lot management in several eastern States, especially in Maryland and Virginia, where it has taken possession of many thousands of acres of idle farm land. The prevailing growth of the species is small, the wood being principally used for fuel, pulp wood, and charcoal. The extension of scrub-pine stands is not advocated, except where it is either impossible or impracticable to secure reproduction of more valuable species.

Relation of light chipping to the commercial yield of naval stores, C. H. HERTY (*U. S. Dept. Agr., Forest Serv. Bul. 90, pp. 36, pls. 3, figs. 13*).—In continuation of previous experiments by the Forest Service for the development of less destructive methods of turpentining (E. S. R., 17, p. 152), experiments were conducted in Florida during a 4-year period on a tract of about 25,000 trees of size suitable for turpentining to determine the yields as well as the effect on the vigor of the trees resulting from chippings of varying width, depth, and height.

The tract of timber was divided into 4 equal crops, including about 8,000 chipping faces each. Crop A was worked in a manner similar to that of surrounding commercial operations; the average depth of the cut in chipping, measuring from the inside of the bark, was 0.7 in. The only variation in crop B was a reduction of the chipping depth to 0.4 in., and in crop C a reduction in the height of the chipped surface by the end of the fourth year to 50 in. as compared with 64.3 in. in crop A. On crop D the chipping was the same as in crop A, but the width of the unchipped surface was increased by raising the minimum diameter of trees to be turpentined from 6 to 10 in., and the minimum diameter of trees to carry 2 chipping faces from 13 to 16 in. No tree in crop D carried more than 2 chipping faces. The shallow and narrow chippings as in crops B and C were also combined and tested for one season. The results of the investigation are summarized and discussed, and detailed yield tables are appended.

The total yield for the 4-year period from the standard crop A, based on corrected data, was 206,235 lbs. of dipped turpentine and 47,742 lbs. of scraped turpentine. Both shallow chipping and narrow chipping as in B and C gave a relatively small but valuable increase in yield of dip which was only partially offset by a reduced yield of scrape. Moreover, laboratory analyses showed that the dip from shallow-chipped trees in the second year was about 10 per cent richer in turpentine than the ordinary dip. The same increase is anticipated in the dip of narrow-chipped trees also. In both B and C there was evident at the end of the second year a heavy reduction in the loss from dead trees and faces abandoned because of dry face. It was also found that C could be profitably worked for a fifth year as a result of reducing the height of cut. The "light cupping" method employed in crop D gave a 35 per cent increase of dipped turpentine and a 13 per cent increase of scraped turpentine. In addition the timber was left in condition to be immediately worked again for a second 4-year period. In crop A a second working was entirely impracticable.

In the 4-year experiments the principal gain from improved methods has been found in the later years, due presumably to a decreased drain on the vigor of the trees. The combined narrow and shallow chipping, however, tried for only one year, showed an increased yield of dip of between 35 and 40 per cent in the single season, and on the basis of the 4-year results it is believed that this increase would have been maintained in subsequent seasons.

Acting on the results secured from Tschirch's studies of resinous secretions and resin ducts, the report of which has been briefly noted (E. S. R., 18, p. 743), it has been found that the first dipping yields from the cup system of turpentining may be considerably increased by making a regular chipping the full width of the face when the gutters are placed on the trees during the winter months. Vertical secondary resin ducts, which constitute the chief source of commercial crude turpentine, are thereby formed along the entire length of the cut, so that in the spring the first regular chipping will open the full number of these ducts instead of only a few ducts near the center of the face where preliminary winter chipping is not employed.

Taken as a whole the chipping experiments appear to demonstrate conclusively that the adoption by turpentine operators of the methods herein described will substantially increase the yield per crop of crude turpentine obtainable in a 4-year period; make possible the indefinite prolongation of the turpentine period; and cause far less sacrifice of merchantable timber. The Forest Service is to undertake continued turpentine experiments in the Choctowhatchee National Forest with the above aims in view.

Australian timber.—Its strength, durability, and identification, J. Mann (*Melbourne, 1909, pp. XVI+148, figs. 19*).—This treatise comprises a compilation of the data available prior to 1900 relative to the strength and durability of about 50 of the best-known engineering and construction timbers of Australia. The information was obtained at the engineering laboratories at the Sydney and Melbourne universities, government departments, and other reliable sources. Reports of subsequent timber tests in various Australian colonies have been noted (E. S. R., 19, p. 950; 20, p. 243; 21, p. 47).

Consumption of wood preservatives and quantity of wood treated in the United States in 1910, H. S. Sackett (*U. S. Dept. Agr., Forest Serv. Circ. 186, pp. 4*).—This is a statistical review based upon reports of 49 firms representing 71 treating plants, or 96 per cent of the plants in operation during the year.

The principal preservatives used, in the order named, are creosote, zinc chlorid, corrosive sublimate, and crude oil. In 1910 over 63 million gals. of creosote, of which 71 per cent was imported principally from England and Germany, and 16,802,532 lbs. of zinc chlorid, obtained from domestic sources, were used. The wood treated included crossties, piling, poles, paving blocks, construction timbers, cross arms, lumber, etc. The total material treated has increased from 68,228,299 cu. ft. in 1907 to 100,079,444 cu. ft. in 1910.

Grazing and floods: A study of conditions in the Manti National Forest, Utah, R. V. R. Reynolds (*U. S. Dept. Agr., Forest Serv. Bul. 91, pp. 16, pls. 5, map 1*).—The present study, which illustrates the harmful effect of overgrazing upon stream flow, is discussed under the following general headings: Grazing history, past floods, damage from floods, efforts to prevent damage, conditions affecting floods, including topography, soil, ground cover, rainfall and torrential run-off, and the future regulation of grazing.

It is concluded that the torrents that have devastated this region within the last 20 years have been caused primarily by overgrazing, and that they can be largely controlled, if not entirely eliminated, by restoration of the natural protective cover of shrubs and grasses.

The National Forest Manual: Trespass (*U. S. Dept. Agr., Forest Serv., 1911, pp. 23*).—This pamphlet, which constitutes a part of the Use Book (E. S. R., 22, p. 542), comprises regulations of the Secretary of Agriculture issued to take effect September 1, 1911, appertaining to trespass upon the National Forests, and instruction to forest officers thereunder.

DISEASES OF PLANTS.

[Mycological studies], H. L. Bolley (*North Dakota Sta. Rpt. 1909, pp. 34–56, 62–66*).—The results are given of investigations on diseases of wheat, flax, and potatoes, but mainly on wheat diseases caused by species of Colletotrichum, Macrosporium, Helminthosporium, and Fusarium which infect the stem, blades, and grain of the wheat and persist in the soil, thereby producing a species of wheat-sick soil.

Tables are given showing the results of various experiments with wheat and flax, including continuous cultures of wheat and flax in sand and in soil, and qualitative determinations of the fungi found in unsterilized and sterilized wheat plants. The bacteriological content of wheat seeds on an experimental plat and the examination of miscellaneous plant disease specimens are reported.

In the work with flax it was found that in addition to flax wilt there is a destructive canker of flax caused by a species of Colletotrichum, and also a disease of the flax bolls caused by species of Alternaria and Macrosporium. The flax canker seems to be confined largely to the western and northwestern dry regions of North Dakota. It is due to *C. lini*, and is characterized by a peculiar breaking off of the nearly mature flax plants at a point near the ground line. The disease is often found on new fields (virgin prairie sod) of flax, and is supposed to be caused by infection from native wild flax, or, more probably, by the use of internally infected seed, as flax seed are often found in which the seed leaves have cankers before the seed are matured. The canker disease is largely amenable to seed selection and seed treatment, but wilt-resistant varieties of flax are not immune to the canker.

A brief account is given of the work done during the past year on the herbarium and mycological survey, including a list of fungi from the State which have been added to the herbarium.

Report of botanist and plant pathologist, H. L. BOLLEY (*North Dakota Sta. Rpt. 1910, pp. 43, 44, 46, 47*).—The work, as in previous years, has been a study of the plants found resident in the soils of old cultivated lands and in the virgin soils, and of the micro-organisms that are found in the soils and upon cultivated plants on such soils. It is claimed that in many cases lands, which no longer produce the proper cereal crops, are not depleted of the plant-food constituents, but are contaminated with certain fungal organisms which attack the cultivated plants, destroying their roots, injuring the straw, and shriveling the grain. This is often the case during the years when otherwise the climatic and soil conditions are particularly favorable for a large growth of grain. It is also claimed that manures which are made in stables in which diseased straw has been used for bedding are very detrimental when spread without composting upon lands that are to raise the same kind of crop as that from which the bedding was made. In the work with bacteria and fungi of the soil it was found that many fungi ordinarily classed as saprophytes, especially Fusarium, Colletotrichum, Macrosporium, Altenaria, and Helminthosporium attack the roots, straw, and seeds of wheat, oats, barley, and flax.

The work so far on soils has been on the Red River Valley soils, and those taken from the demonstration farm at Rugby.

Reports on the diseases of economic plants in Germany for 1906, 1907, and 1908 (*Ber. Landw. Reichsamte Innern* [*Germany*] *1909, Nos. 13, pp. VII+179; 16, pp. VII+215; 1910, No. 18, pp. VIII+209*).—These reports include discussions of the meteorological conditions, the influence of disease on the yield of certain crops, and various fungus, insect, and weed pests of field, forest, orchard, and truck crops during each of the years 1906, 1907, and 1908.

New observations on potato and grain diseases, J. VAÑHA (*Wiener Landw. Ztg., 60* (*1910*), *No. 95, p. 966*).—The author claims to have found in the potato tissues attacked by leaf-roll disease not only the fungus *Solanella rosea* (E. S. R., 24, p. 154), but also 2 others, for which the names *Sclerotinia solani* n. sp., and *Vermicularia dissepta* n. sp., are proposed.

Crown gall and sarcoma, E. F. SMITH (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 85, pp. 4*).—Attention is again called to the resemblance in crown gall of plants to certain malignant animal tumors (E. S. R., 25, p. 243), especially sarcoma, and the results of further investigations on the origin and character of the secondary crown gall of plants are given.

From experiments with pure cultures of the daisy schizomycete the following facts were obtained: The bacterium causing the primary tumors was found to occur also in the secondary tumors and sparingly in the tissues between the tumors. In this disease a cell stimulus begun in the primary tumors by the parasite is not able to propagate itself independently of the inciting organism. On the contrary, the bacterium and the tumor cells occur together both in the primary and secondary tumors, the one inside of the other.

The causative organism has not been seen in situ in the cells owing to inability to stain the organism without at the same time staining many confusing granules, but the indirect evidence of its presence is clearly proved by obtaining from the interior of the tumor tissues by the poured plate method the tumor-producing organism, *Bacterium tumefaciens*, even when stained sections of such tissues when studied under the microscope showed no evidence of the presence of the bacterium. It is claimed that deep-seated tumor strands are often found connecting primary and secondary tumors, wedging their way through the interior of stems and leaves after the manner of a foreign body. When the primary tumor occurs on a stem and the secondary tumor on the leaves, the leaf traces and the loose cellular structure of the petioles are replaced by a firm greenish pseudopith or tumor tissue surrounded by a cylinder of wood, beyond which is a cambium and then a bark covered with cork.

Full details will appear in a later bulletin.

The rusts of grains in the United States, E. M. Freeman and E. C. Johnson (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 216, pp. 87, pl. 1, dgms. 2*).—This paper contains the results of recent investigations by the Office of Grain Investigations in cooperation with the Minnesota Agricultural Experiment Station in regard to the distribution, relationship, physiology, and life histories of the important grain rusts, and gives much new information on the biological forms of rust, vitality of successive uredo generations, wintering of the uredo generations, and climatology in relation to rust epidemics. Former experiments on rust are summarized and methods of selection and breeding of grains for rust resistance indicated.

The rusts discussed in this paper are as follows: Stem rust of wheat (*Puccinia graminis tritici*), leaf rust of wheat (*P. rubigo-vera tritici*), stem rust of oats (*P. graminis avenæ*), crown rust of oats (*P. coronata*), stem rust of barley (*P. graminis hordei*), leaf rust of barley (*P. simplex*), stem rust of rye (*P. graminis secalis*), and leaf rust of rye (*P. rubigo-vera secalis*).

As a result of these investigations it is claimed that the morphological characteristics, life histories, and physiological specializations of parasitic fungi, including the rusts, may vary with the geographical distribution. The stem rusts of wheat, rye, oats, and barley, both in Europe and America, may produce the æcidial stage on the barberry, but that this is necessary for continuous propagation from one season to the next has been disproved by experiments.

The æcidial stage of the crown rusts of oats occurs in Europe on *Rhamnus frangula* and *R. cathartica*, and in the United States on *R. lanceolata*, *R. caroliniana*, and *R. cathartica*. The æcidial stage of the leaf rust of rye occurs in Europe on *Anchusa officinalis* and *Lycopsis arvensis*. The European and American forms are believed to be identical. The æcidial stage of the leaf rust of barley is not known in Europe or America. This rust seems not to have been previously reported in this country.

The authors report the transferrence in the uredospore stage of the following rusts: "Stem rust of wheat (*P. graminis tritici*) from wheat to wheat, rye, and barley, but not to oats; from wheat to barley and then to wheat and rye; and from wheat to barley successively three times and then to oats. Stem rust of barley (*P. graminis hordei*) from barley to barley, oats, rye, and wheat; from barley to wheat and then to barley, wheat, oats, and rye; and from barley to rye, to barley, and then to wheat, oats, and rye. Stem rust of rye (*P. graminis secalis*) from rye to rye and barley from rye to barley and then to barley, oats, and rye; and from rye successively to barley, to barley, and to rye. Stem rust of oats (*P. graminis avenæ*) from oats to oats and barley, but not to wheat or rye. Leaf rust of wheat (*P. rubigo-vera tritici*) from wheat to wheat, rye, and barley. Leaf rust of barley (*P. simplex*) from barley to barley only. Leaf rust of rye (*P. rubigo-vera secalis*) from rye to rye only. Leaf rust of oats (*P. coronata*) from oats to oats and barley, but not to wheat or rye."

The following points as to the biologic forms of cereal rusts are emphasized: "(1) The stem rusts on wheat, barley, rye, and oats are undoubtedly biologic forms of the same species, *Puccinia graminis;* (2) these forms are not entirely confined to their hosts, but vary in range in part according to the host plants they have been recently inhabiting; (3) the leaf rusts on wheat and rye are more highly specialized than the corresponding stem rusts; (4) the stem rust on barley has ordinarily the widest, while the leaf rusts on barley and rye have the most restricted, range; (5) under favorable conditions all the stem rusts can be carried successfully to the four cereals; (6) when rusts are transferred to uncongenial hosts, if pustules are produced they are small and weak; (7) two biologic forms may inhabit the same cereals without being identical; (8) by gradual variation and adaptation to varying conditions a rust species widely distributed may form a number of strains or types, differing in physiological reactions; (9) the host plants exercise a strong influence not only on the physiological and biological relationships, but in some cases even on the morphology of the uredospore."

Many investigators hold that the æcidial stage serves to reinvigorate the fungus, and to test this theory continuous cultural experiments with the uredospores of 6 different grain rusts were undertaken by the authors, and 52 successive uredo generations of each rust grown without the intervention of any other spore form and without any diminution in the vigor of the rust tested. It is claimed that the uredo stage of *P. graminis* and *P. rubigo-vera* live over the winter in the United States, as evidenced by work of previous investigators and confirmed by experiments cited in this bulletin. It is claimed that rusts in the uredo or æcidial stages are present in different parts of the country at all times of the year, and by means of the wind or other agencies these spores may be carried from regions where they are abundant to places where the grain is in a receptive condition It is claimed that the uniformly low temperature during the critical months of 1904 was a very important factor, if not the determining factor, for the rust epidemic of that year. The breeding of rust-resistant varieties of grain is the only method promising a successful combating of grain rusts so far as discovered.

A bibliography of 106 titles is appended.

Fusarium on cereals and its effect on germination and the wintering of the grain, L. HILTNER and G. IHSSEN (*Landw. Jahrb. Bayern, 1* (*1911*), *Nos. 1, pp. 20–60, figs. 8; 4, pp. 315–362, figs. 2; abs. in Deut. Landw. Presse, 38* (*1911*), *No. 6, pp. 55–58, figs. 3*).—The authors claim that the poor stands of winter grains often seen are due to attacks of *Fusarium nivale* which originate from seed-borne spores of the fungus.

Special attention is called to the results obtained from experiments on seed disinfection with a 1 per cent solution of corrosive sublimate, in which better germination, more vigorous growth, and greater yields were obtained than with the untreated grain on the check plats.

A cytological investigation of the grain rusts and the mycoplasm theory of Eriksson, F. ZACH (*Sitzber. K. Akad. Wiss.* [*Vienna*], *Math. Naturw. Kl., 119* (*1910*), *I, No. 4, pp. 307–330; abs. in Bot. Centbl., 116* (*1911*), *No. 1, pp. 17, 18; Centbl. Bakt.* [*etc.*], *2. Abt., 30* (*1911*), *No. 4–6, pp. 98–100*).—A cytological study is reported of the leaves and stems of Secale affected by the uredospore mycelia of *Puccinia graminis* and *P. glumarum*, in which the so-called plasmonuclei of Eriksson and also other smaller bodies were observed. The larger nucleus-like bodies the author concludes are not real nuclei, but are probably haustoria in the cells.

Wheat rust (*Dept. Agr. Egypt, Agr. Notes, 1911, No. 1, pp. 6*).—In a discussion of rusts in general and of wheat rust in particular, the claim is made that only one species of wheat rust is known in Egypt, probably *Puccinia graminis*.

On the curly leaf disease of cotton, G. KRÄNZLIN (*Pflanzer, 6* (*1910*), *Nos. 9–10, pp. 129–145; 11–12, pp. 161–170*).—A study is reported of the development of this disease, the alteration in the host produced by it, the condition of the various organs of the plant, and the influence of climate and soil on the disease.

The first symptom is the appearance in the field of areas in which the plants bear a more intense green color than normal, accompanied by a different position of the foliage. Later the leaves become discolored and curly.

From investigations conducted the author concludes that the disease is not of parasitic origin, nor due exclusively to soil or climatic conditions, but that it is probably the result of a too rapid and strong growth of the plants in connection with the attacks of the cicads.

Two recent important cabbage diseases of Ohio, T. F. Manns (*Ohio Sta. Bul. 228, pp. 255–297, figs. 26*).—A study is reported of "yellows" or Fusarium wilt and of blackleg or foot rot (*Phoma oleracea*) of cabbage, including symptoms of these diseases, methods of dissemination, losses caused by them and methods of control.

The Fusarium wilt is characterized by a yellowing of the lower, outer leaves, which later drop from the plant at the slightest touch. In older plants, sometimes stumps nearly full size may be seen that have shed all their leaves. Cross sections of infected stumps and roots, when not associated with bacterial action, show a light yellowing or browning of the vessels. If bacteria are also present, the vessels change to a dark brown or jet black.

No specific treatment is known for this wilt but seed treatment with formaldehyde, new seed beds each year, the use of only the most healthy and vigorous plants, immediate destruction of diseased plants if any should appear, rotation of crops, and the rejection of manures carrying infected cabbage litter are some of the means suggested for combating it.

The usual characteristic symptoms of blackleg or Phoma rot of the cabbage are described and comparisons made between the symptoms of this disease and the Fusarium wilt. In addition to the same methods as those recommended for combating the Fusarium wilt, a thorough spraying of the seed beds with Bordeaux mixture, particularly just before transplanting is advised, as one of the most active means of disseminating this disease is infection of healthy plants from a few diseased ones at the time of transplanting by the smearing of the spores on the healthy plants.

A brief bibliography is appended.

The Fusarium blight (wilt) and dry rot of the potato, T. F. Manns (*Ohio Sta. Bul. 229, pp. 299–336, figs. 18*).—This is a general discussion of this disease, including its history as a storage rot and as a field trouble, the cause of dry rot in storage, losses from using infected seed and from sick soil conditions, studies on the seed-potato condition in 1909 and 1910, culture work, and artificial inoculation work with sick soils in the greenhouse, factors which influence the progress and dissemination of the disease, early versus late planting, storage conditions for seed purposes, the length of crop rotations, care of refuse and infected material, field experiments in controlling the disease, effects of sprays on foliage, and remedial measures.

It was found that the dry-rot fungus (*Fusarium oxysporum*) of the potato is a common field trouble in Ohio, causing a blight and wilting of the crop and producing a sick soil condition in many potato districts. The field symptoms are a cessation of growth and a yellowing of the foliage with an upward and inward rolling of the leaves, accompanied by wilt during the heat of the day. The causative organism is carried within the tubers, which are the chief means of distributing the disease. This internal infection of the tuber is characterized by brown or black areas, usually in the fibrovascular ring.

The use of sound seed tubers, a 5 or 6 year crop rotation, especially with grass or grain crops, and the avoidance of infected barnyard manures as a fertilizer for potato lands are some of the suggestions given for the control of this disease.

The cause of gummosis of tobacco and experiments on its control, J. A. Honing (*Meded. Deli-Proefstat. Medan, 5 (1911), No. 6, pp. 169–185*).—This is a further study of this disease along lines similar to those followed in the first report (E. S. R., 24, p. 248), and includes infection experiments, a method of detecting the slime bacteria in the soil, and tests with chlorid of lime and potassium permanganate for controlling the disease.

A new fungus on dying apple trees, R. Laubert (*Gartenflora, 60 (1911), No. 4, pp. 76–78, fig. 1*).—The author describes as a new genus and species *Pseudodiscula endogenospora*, a semiparasitic fungus found on the bark of dying and dead young apple trees.

A new fungus on dying apple trees, R. Laubert (*Gartenflora, 60 (1911), No. 6, pp. 133, 134*).—A taxonomic discussion of the fungus noted above, in which the author decides that the fungus should be called *Sclerophoma endogenospora*.

Further researches on the development of roncet of the grape, E. Pantanelli (*Atti R. Accad. Lincei, Rend. Cl. Fis., Mat. e Nat., 5. ser., 20 (1911), I, No. 8, pp. 575–583*).—A general summary is given of the conditions of culture, soil, etc., which are associated with this disease of the grape, and the resistance of certain varieties of grapes to its attack is discussed.

The Sclerotinia (Botrytis) disease of the gooseberry, or die-back (*Bd. Agr. and Fisheries [London], Leaflet 248, pp. 1–7, figs. 5*).—The symptoms of this disease and remedies for its control are given. It may attack the main stem and base of the branches, the young wood of the current year's growth, the leaves, and the berries.

The best method of controlling the disease is the prompt removal and burning of all dead bushes and branches. Heavy spraying with copper sulphate solution (4:100) just before the buds burst will kill the tufts of conidia which appear on the infected stems and branches, thus checking to some extent the spread of the disease, while spraying the foliage with Bordeaux mixture (8:8:100) will often prevent serious leaf infection.

A stem canker of Robusta and Quillou coffee, F. C. von Faber (*Teysmannia, 21 (1910), No. 9, pp. 548–555*).—A description is given of a new coffee disease which causes the leaves to become yellow and hang down against the stem, while dark-brown to black cankerous areas appear on the bark.

By microscopical examinations and culture tests the cause of the disease was found to be a fungus, for which the name *Ascospora coffeæ* n. sp. is proposed. Infection experiments showed that the fungus does not attack sound, healthy trees, but enters through wounds in the bark.

The remedies suggested are the digging up and burning of the diseased plants.

Arrowroot diseases (*Agr. News [Barbados], 10 (1911), No. 237, pp. 174, 175*).—In an extract from a report of F. W. South on a "burning" of arrowroot in St. Vincent the characteristics of this disease and remedial measures are discussed.

The disease has been known on the island for a number of years and is widely distributed, appearing at places here and there in the fields, but spreading very slowly. The diseased plants have fewer leaves than healthy ones, and these are often rolled up and somewhat wilted, while the scale leaves of the rhizome are blackened throughout. The disease penetrates to the rhizome, forming small black spots, which increase in size until most of the surface becomes black. Dark-brown streaks ⅛ mm. in size run inward from the surface in a radial direction. A brown mycelium was found in narrow strands along the surfaces of the scale leaves, from which, under damp conditions, a white mycelium may often develop between the surfaces of the creeping stems and the inner surfaces of the scale leaves.

Cassava, tannia, yam, Indian corn, pigeon pea, plantain, banana, cacao seedlings, and bush plants are also attacked by this fungus. The systematic position of the fungus is not known.

The author advises the complete uprooting and burning of all diseased plants, followed by a thorough stirring of the soil and a 3-year planting with cotton before arrowroot is again planted in the soil.

Soft rot of ginger in the Rangpur District, eastern Bengal, W. McRae (*Agr. Jour. India, 6 (1911), No. 2, pp. 139–146, pls. 2*).—The symptoms of this disease, the damage done by it, and its causative organism are given, together with means for its control.

The disease produces a soft rot of the rhizomes, which is disseminated by planting diseased seed rhizomes, and is caused by the fungus *Pythium gracile*. The remedies suggested are the uprooting and burning of all diseased plants, including the roots and rhizomes, a 3-year rest for ginger land before replanting to this crop, the use of healthy seed, good drainage, and soil aeration.

The timber rot caused by Lenzites sepiaria, P. Spaulding (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 214, pp. 46, pls. 4, figs. 3*).—This paper summarizes and brings up to date our knowledge concerning this serious wood-rotting fungus, contains new information concerning its life history derived from experiments in the laboratory and field, and gives methods for combating its ravages. The author discusses the economic importance of *L. sepiaria*, its distribution and hosts, and gives the characteristics of the fungus, its development, germination of spores, cultures, and inoculation experiments, describes the characteristics of the decayed wood, cites experiments which prove that *L. sepiaria* causes the decay attributed to it, and gives the factors governing the growth of wood-rotting fungi and the various methods used for preventing the decay caused by them. The paper closes with a brief summary of the extent of the damage done by this organism and its distribution. It is claimed that the Lenzites rot may be prevented or greatly retarded (1) by seasoning, (2) by floating, and (3) by chemical treatment of the timber with infiltrates which would be deleterious to fungus growth.

An extensive bibliography is appended.

Investigations on the employment of carbolineum compounds as fungicides, and their effects on plants. E. Molz (*Centbl. Bakt.* [etc.], *2. Abt., 30 (1911), No. 7–12, pp. 204–232, pls. 6, fig. 1*).—The results are reported of experiments on the use of carbolineum and various tar oils.

Very good results were obtained when the cankers of *Nectria ditissima* on the trunks of apple trees were treated with carbolineum, but a 1 per cent water solution of carbolineum protected the grape for only a short period against attacks of *Plasmopara viticola*. In plate culture tests with water-soluble carbolineums it was found that *Sclerotinia fructigena*, *Botrytis cinerea*, and *Penicillium glaucum* were all checked in their development, especially *S. fructigena*, and this effect was more pronounced than that produced by copper sulphate solutions.

The fungicidal and bactericidal power of the light tar oils was found to be very small. The bactericidal action of tar oils seems to depend mainly on its phenol content, and those of a specific gravity of 1.023 were most effective as fungicides and bactericides. Plant tissues were much injured by the action of phenols. The vapor of tar oils, especially of the lighter ones, was found to act injuriously on plants, and a 1 per cent water solution of tar oil in most instances injured the foliage of trees. The use of carbolineum paints on the trunks of trees showed no injurious effects. The spring treatment of wounds with carbolineum preparations was found to be injurious, often causing an enlargement of the wounded area and a slow healing of the wound.

Tar oils containing phenol, or, still better, the crude carbolic acid itself, were found to be very effective as herbicides when used in a 15 per cent solution.

The first injurious effects of soils containing carbolineum solutions were observed when the soil contained 0.02 gm. of water-soluble carbolineum per pot of 200 gm. of earth, and the injury manifested itself by a diminished growth of the plant. On grapevines treated with carbolineum the first injury was observed from a water-soluble solution of 2 gm. per pot. The soil disinfection with carbolineum compounds was greatest when the crude tar oil itself was used, but was injurious to plant production if used on the soil shortly before planting. If, however, the soil was treated several months before the planting, the yield was increased.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Our grosbeaks and their value to agriculture, W. L. McAtee (*U. S. Dept. Agr., Farmers' Bul. 456, pp. 14, figs. 3*).—Seven kinds of finches, commonly known as grosbeaks, are said to summer within the United States. Two of them live mainly in cold or mountainous areas and have little to do with farms or with the insects that prey on crops. The other 5, namely, the rose-breasted grosbeak or potato-bug bird, the cardinal or redbird, the black-headed grosbeak or western grosbeak, the blue grosbeak or blue pop, and the gray grosbeak or parrotbill, live largely in agricultural regions and secure most of their food about cultivated lands. All 5 feed to some extent upon crops, but only one does appreciable harm. On the other hand, all perform invaluable service in destroying certain of our worst insect pests.

The author briefly describes the food habits, a fuller account of which has been previously noted (E. S. R., 19, p. 958), and the means of preventing them from damaging crops, and of attracting and protecting them.

"Present investigations prove that the services of grosbeaks in destroying insect pests are invaluable. Each kind pays special attention to certain pests which if unchecked would cause enormous losses. Few of our birds are to be credited with more good and with fewer evil deeds than the grosbeaks, and none more clearly deserve protection by the practical farmer."

A brief report on the work now being prosecuted by some economic entomologists in the state universities, agricultural colleges, and experiment stations of the United States, T. J. Headlee (*Jour. Econ. Ent., 4 (1911), No. 1, pp. 35–47*).—A report presented at the twenty-third annual meeting of the American Association of Economic Entomologists.

Report of the entomologist of the Arizona Horticultural Commission for the year ending June 29, 1910, A. W. Morrill (*Ariz. Hort. Com. Ann. Rpt., 2 (1910), pp. 8–15*).—The insects, the occurrence of which is briefly noted, are the codling moth, woolly aphis, bryobia mite, date-palm scales, grasshoppers, orange thrips, ants, and soft scale. Inspection work and insect control are also briefly considered.

Sixth annual report of the state entomologist of the State of Maine, E. F. Hitchings (*Ann. Rept. State Ent. Maine, 6 (1910), pp. 39, pls. 2*).—The author reports briefly upon the occurrence of some of the more important insects of the year and upon the work of nursery inspection. A report by E. E. Philbrook, special field agent in charge of the gypsy moth work, is appended.

Injurious insects, C. B. Waldron (*North Dakota Sta. Rpt. 1910, pp. 51, 52*).—Grasshoppers, the only pests that caused serious injury during 1910, were the source in a few instances of total losses of from 80 to 100 acres of grain. Meadows and pastures suffered severely and fruit trees and shrubs to a considerable extent. Losses to garden crops were also very common. The destruction was caused almost wholly by 3 native species, namely, the two-striped locust (*Melanoplus vivitattus*), the red-legged locust (*M. femur-rubrum*), and the lesser migratory locust (*M. atlantis*).

Papers on insects injurious to citrus and other subtropical fruits.—The orange thrips: A report of progress for the years 1909 and 1910, P. R. Jones and J. R. Horton (*U. S. Dept. Agr., Bur. Ent. Bul. 99, pt. 1, pp. 16, pls. 3, figs. 2*).—This is a report of studies of the orange thrips (*Euthrips citri*) in continuation of those of Moulton previously noted (E. S. R., 20, p. 956).

This species is thought to be a native of the Sierra Nevada foothills or the adjoining plains of the southern San Joaquin Valley. It is distributed throughout the entire orange belt of the San Joaquin Valley and has been collected in several places in Southern California and at Phoenix, Ariz., by the senior author. The infestation in Arizona embraces orange groves in the Salt River Valley surrounding Phoenix. It has also been reported from Hermosillo, Sonora Province, Mexico. Attention is called to the fact that while *E. occidentalis* also is occasionally found upon citrus trees, as reported by Coit (E. S. R., 21, p. 44), it rarely causes serious injury.

In addition to citrus, the authors have taken the orange thrips from pomegranate (*Punica gramatum*), varieties of European grape, California pepper tree (*Schinus molle*), umbrella tree, pear, apricot, peach, varieties of European plum, willow (*Salix* sp.), dock (*Rumex* sp.), purslane (*Portulaca oleracea*), olive, red raspberry, rose, and *Solanum* sp.

Technical descriptions are given of the egg, larva, and pupa. The orange thrips passes the winter in the adult state, and it is generally the adult form which first becomes conspicuous upon the orange trees in the spring. Examinations for eggs revealed the fact that most of them are placed in the new, tender growth, being inserted into both upper and lower leaf surfaces and also in the shoots. They are also placed in the receptacles of the blossoms after the petals have fallen and in young fruit and fruit stems. The relative abundance of the thrips on various food plants during the season is diagrammatically illustrated. The life cycle obtained by adding the average lengths of egg, larval, and pupal stages and allowing 3 days for the preoviposition period was found to be 18.68 days from May to August, 1909, while for the months from April to August, 1910, the period was 23 days. "Although the number of generations in a season has not been definitely observed, there are probably 4 and a partial fifth during the period of May to July, inclusive, and 1 generation in each of the months of March, April, August, September, and October, making in all a possibility of 8 to 10 generations for the season." Its ability to run, leap, and fly is much greater than that of any other thrips so far observed by the authors, who have frequently seen adults fly from one tree to another 20 ft. or more distant.

The spraying experiments here reported show that the pest can be controlled by 4 sprayings of lime-sulphur solution combined with a commercial tobacco extract, which should be applied when the thrips become sufficiently numerous. Three applications should be made in the spring months to save the fruit and spring growths from injury, and one in the fall to lessen the feeding injury to the fall growth of the orange trees. The 3 spring applications should be made as follows: The first just after most of the petals have fallen; the second, from 10 to 14 days after the first; and the third, from 3 to 4 weeks from the time of the second treatment. The spraying solution should consist of lime-sulphur (33° B.) 1:75 and blackleaf tobacco extract (2¾ per cent nicotin) 1:100; or, using blackleaf "40" (40 per cent nicotin) tobacco extract 1:1,800. If lime-sulphur of 36° B. is used, the formula would be lime-sulphur 1:86 and blackleaf tobacco extract 1:100; or blackleaf tobacco extract "40" (40 per cent nicotin) 1:1,800. From 2 to 8 gals. of this combination spray should be applied per tree, at a high pressure, and in a very thorough manner, as only thrips that are hit will be killed. The spraying experiments have shown that 3 thorough applications at the proper times result in from 20 per cent to 60 per cent more "fancy" fruit in the sprayed as compared with the unsprayed blocks.

Occurrence of Euthrips pyri in New York State, P. J. PARROTT (*Science, n. ser., 34 (1911), No. 864, p. 94*).—The author reports the discovery of *Euthrips pyri* in New York orchards. During the spring of 1911 specimens of injured blossom clusters were received from Germantown and other localities along the Hudson River. The peculiar blighting of pear blossoms in various localities in the State during the past several years, which has been attended by considerable loss in the fruit yields, is thought to have been due to this pest.

Tests which have been conducted indicate that the thrips may be effectively combated by slight changes in the scheme of spraying which the author is encouraging growers to adopt for the control of the pear psylla.

The pear psylla, P. J. PARROTT (*West. N. Y. Hort. Soc. Proc., 56 (1911), pp. 73–82, figs. 6*).—The year 1910 is reported to have been notable for the overwhelming invasion of pear orchards in western New York by this insect. By midsummer the foliage of most of the pear orchards was scanty, blackened, and badly discolored. In some instances the fruit dropped and failed to mature, thus reducing the yield.

Observations made at Lockport showed the adults to be appearing on March 26, eggs being laid on April 2 and hatched on April 19. On the basis of observations and experiments, the author considers the most practical preventive and remedial measures to consist of (1) clean culture, (2) removal and destruction of the bark of trees on which the pest is hibernating, (3) spraying of trunks and large limbs with miscible oil, kerosene emulsion, or whale-oil soap to destroy those that are hibernating, (4) spraying of trees just before the leaves appear with lime-sulphur wash to destroy eggs, and (5) spraying of trees with kerosene emulsion, whale-oil soap, or tobacco extract at summer strengths to kill newly hatched nymphs.

The cabbage aphis (Aphis brassicæ), G. W. HERRICK and J. W. HUNGATE (*New York Cornell Sta. Bul. 300, pp. 717–746, pls. 4, figs. 5*).—The cabbage aphis, which is of European origin, found its way into this country more than a century ago and is now a pest throughout the United States, having been described in the bulletins of 23 state experiment stations. In 1890, 1903, and 1908 it was very numerous, widespread, and destructive in New York State, the year 1903 being particularly an aphis year. More inquiries were received by the Cornell Station in 1909 and 1910 regarding this aphis than any other insect pest.

"Aside from cabbages, this aphis attacks and injures turnips, cauliflowers, Brussels sprouts, rape, kohl-rabi, collard, kale, and broccoli. It is often found on the seed stalks of radish, and it frequently destroys seed stalks of cabbage. In addition to these, it has been found on shepherd's purse, field cress (*Isatis tinctoria*), white mustard (*Brassica alba*), charlock (*B. [Sinapis] arvensis*), black mustard (*B. nigra*), wild radish (*Raphanus raphanistrum*), *B. fructulosa*, *B. adpressa*, and *Diplotaxis tenuifolia*." The authors' observations lead them to conclude that while it is possible that this aphis may have an alternate food plant, it does not always depend upon it.

Studies of its life history, which are reported in detail, include technical descriptions of the several forms. The authors found that there were 30 generations in approximately 1 year with an average for each generation of 12¾ days. There may be 16 generations from March 31 to October 2, and all of these may be born in the field in some seasons. It was found that 1 female may bear 50, 60, or even 70 young, and each of these in turn may bear as many young, and so on throughout the season. The winter is usually passed in the egg stage.

At least 2 species of primary parasites, *Xystus brassicæ* and *Aphidius (Diæretus) piceus*, are abundant in New York State. Other insects, reared from the bodies of aphids on cabbage leaves, were *Asaphes rufipes*, supposed to be a hyperparasite, and *Pachyneuron micans*. Two species of lady beetles, namely, *Adalia bipunctata* and *Hippodamia convergens*, were very abundant in 1910 and did effective work in destroying the aphids. The larvæ of at least 4 species of Syrphus flies, namely, *Sphærophoria cylindrica*, *Allograpta obliqua*, *Syrphus americana*, and *S. ribesii*, were seen feeding on the aphis in the State.

Methods of control include the destruction of cabbage leaves and stumps, dipping of seed-bed plants or fumigation of seed beds with tobacco paper, and the spraying of plants in the field. Seed-bed plants were dipped in a homemade fish-oil soap made in the following proportions: Caustic soda 1½ lbs., water 1½ qts., and fish oil 5½ lbs. A 1:8 solution of this soap is said to have killed every aphid hit. In experiments with Leggett's Anchor Brand of whale-oil soap, 1:8 solutions gave equally good results, but weaker solutions of 1:10 and 1:15 were inferior to like solutions of the fish-oil soap. But few aphids were killed when plants were dipped in Blackleaf 1:64.

"A series of plants dipped in solutions of lime-sulphur, 32.5° B. in the proportions of 1:40 and 1:30, were quite badly burned in every case and only a small percentage of aphids was killed. The tendency of the lime-sulphur to run off the leaves without apparently touching the aphids was almost as marked as in the case of the tobacco extract. In . . . laboratory experiments in which individual plants well infested with lice were sprayed with solutions of lime-sulphur at the rate of 1:20, 1:15, and 1:10 of water, respectively, the plants were injured in every case and but 55 to 65 per cent of the aphids was killed."

In tests made of Nico-fume, 1 paper was used to every 25 sq. ft. of surface, a smoke-proof muslin attached to a skeleton frame 1 ft. high being used as a cover. The aphids on plants fumigated in this way for 30 minutes were killed and the plants not injured.

It was found that the homemade soap solutions did not kill the immature stages of the parasites when protected by the dried skins of the dead aphids.

The authors estimate that cabbages in the field can be sprayed with a power sprayer at a cost not to exceed 75 cts. per acre. It was found in field experiments that the cost with a knapsack sprayer was a fraction over $2.15 per acre, including labor and material when the fish-oil soap was used and could be purchased at 3½ cts. per pound.

A list of the more important articles on this aphis is appended.

The cabbage aphis, Aphis brassicæ, G. W. Herrick (*Jour. Econ. Ent.*, *4* (*1911*), *No. 2*, *pp. 219–224*).—The data here presented are included in the article noted above.

White flies injurious to citrus in Florida, A. W. Morrill and E. A. Back (*U. S. Dept. Agr., Bur. Ent. Bul. 92, pp. 109, pls. 10, figs. 19*).—This bulletin presents the principal results of studies of the life history, seasonal history, habits, food-plant relationships, etc., of the citrus white fly (*Aleyrodes citri*) and the cloudy-winged white fly (*A. nubifera*).

A list is given of 12 species and one subspecies of Aleyrodidæ known to breed upon citrus, together with their distribution and food-plant records. Of these, *A. citri*, *A. giffardi*, *A. howardi*, and *A. nubifera* are known to be orange pests or capable of becoming orange pests. *A. floridensis*, *A. mori*, *A. mori arizonensis*, and *Paraleyrodes perseæ* apparently are not likely to cause injury to citrus, while the 5 remaining are doubtful in this respect.

The origin of the citrus white fly is by circumstances quite definitely indicated as Asiatic. In addition to Florida, where about 40 per cent of the orange groves of the State are estimated by the authors to be infested, it occurs in South Carolina, southern Georgia, Alabama, Mississippi, Louisiana, Texas, and California (in which State it was first discovered in 1907). Outside of the United States it is known to occur in Mexico, Brazil, Chile, China, Japan, and India (Northwestern Himalayas). So far as known it does not occur in Cuba. It is estimated that this species was the source of total loss in value of fruit of $696,700 of the crop of 1907–8 and that the crop of 1908–9 was affected to the extent of $750,000.

The authors find that *A. citri* shows a greater degree of adaptation to the umbrella tree than to citrus, that the adults are so strongly attracted by growing leaves of umbrella trees that under certain conditions with umbrella and citrus trees growing side by side more adults collect on 3 or 4 umbrella leaves than are present on an entire citrus tree of medium size.

The eggs hatch in from 8 to 24 days, according to the season. "During ordinary summer weather from 75 to 100 per cent hatch on the tenth to twelfth day. Infertile eggs hatch as readily as fertile eggs and produce adults of the male sex only. After hatching, the young larva actively crawls about for several hours, when it ceases to crawl, settles upon the underside of the leaf, and begins to feed by sucking the plant juices. It molts three times before becoming a pupa. After the first molt the legs become vestigial; hence thereafter it is impossible for it to change materially its location upon the leaf. Larval life averages in length from 23 to 30 days. The pupa closely resembles the grown larva and requires from 13 to 304 days for development. The adult fly has an average life of about 10 days, although several females have been known to live 27 days. Females may begin depositing eggs as soon as 6 hours after emergence and continue ovipositing throughout life. The maximum egg-laying capacity is about 250 eggs, although 150 more nearly represents the number laid under grove conditions. Unfertilized females deposit as many eggs as fertile females. The entire life cycle from egg to adult requires from 41 to 333 days; the variation in the number of days required from eggs laid on the same leaf on the same day is very remarkable." This variation is absolutely independent of both temperature and humidity influences. The sums of effective temperatures required for the minimum duration of immature stages for individuals developing from eggs deposited between February 23 and August 8 vary from 1,641 to 2,153°, with an average of 1,846°, which may be regarded as very nearly the normal for minimum development up to the time when all individuals winter over as pupæ. During the course of the year the fly may pass through a minimum of 2 generations and a maximum of 6 generations. The generation started by the few adults that emerge during the winter is entirely dependent upon weather conditions and may or may not occur. Each generation except those started after the middle of August is more or less distinctly two-brooded.

"Specimens of the cloudy-winged white fly (eggs, larvæ, and pupæ) in the collection of the Bureau of Entomology show that this species occurred on oranges in the United States as early as 1889. The records in connection with the specimens show that it was collected in Mississippi and North Carolina in 1889, in Louisiana in 1890, and in Florida in 1895. Outside of the United States it is known to occur only in Cuba. Its introduction into the United States from Cuba does not seem as probable as its introduction into Cuba from the United States. Its food-plant differences and adaptations are such that orange trees are not as a rule subject to as heavy infestations as by the citrus white fly, although with grapefruit trees this situation is usually reversed. Most important as a factor limiting the injury from the cloudy-winged white fly is that when both occur in an orange grove the citrus white fly almost invariably predominates and the cloudy-winged white fly assumes a position of comparative insignificance."

The authors estimate that there are about 5 per cent of the orange and tangerine groves in Florida infested by the cloudy-winged white fly that are not also infested by the citrus white fly, and that there are in addition 1 per cent of orange and tangerine groves infested by both species, but in which the citrus white fly has not as yet attained injurious abundance. The average damage from the cloudy-winged white fly is estimated at about 10 to 15 per cent lower for oranges where that species alone infests the grove than where the citrus white fly is the species concerned. For injury to grapefruit the authors consider 25 per cent a fair estimate of the injury by the cloudy-winged white fly as compared with about 10 or 15 per cent by the citrus white fly. The total loss in Florida due to the cloudy-winged white fly is estimated by the authors at between $100,000 and $125,000 per annum at the present time. So far as known at the time of writing the cloudy-winged white fly occurred in 12 counties in Florida. Outside of Florida, it has been collected at New Orleans and Baton Rouge, La., Pass Christian, Miss., and Raleigh, N. C. It appeared at Bakersfield, Cal., in 1907, but appears to have been eradicated from the State. It is not known to breed upon any other plant than citrus in Florida,'but has been discovered infesting rubber trees (*Ficus nitida*) growing in the greenhouses in Audubon Park, New Orleans.

The egg of the cloudy-winged white fly differs from that of the citrus white fly in that it is not greenish-yellow and highly polished, but bluish or grayish black and roughened by a film of wax arranged in a hexagonal pattern. The duration of the egg stage is in general slightly longer than that of *A. citri*. As the bulk of the eggs hatch from 1 to 10 days later, a slightly higher number of degrees of accumulated effective temperature are necessary, and hatching is more evenly distributed though not always extending over a larger number of days. It has been found that virgin females of this species will deposit eggs and that these readily hatch and produce healthy larvæ.

The larvæ of *A. nubifera* are slower in maturing than those of *A. citri*. While this difference is not so pronounced during the warmer months of the year, the total average number of days being 25.9 and 23.1, respectively, during the cooler months it is very striking, the total average number of days then being 56.7 for *A. nubifera*, as compared with 30.4 for *A. citri*. In other respects the duration of the larval instars for the 2 species is the same. Little difference exists between the length of the pupal stages. It is estimated that the maximum egg-laying capacity of *A. nubifera* is not far from 200.

A note on the Indian enemies of Aleyrodes citri, with description of a new species of Prospaltella, L. O. HOWARD (*Jour. Econ. Ent., 4 (1911), No. 1, pp. 130–132*).—Investigations made in India by an agent of the Bureau of Entomology of this Department have shown that the citrus white fly (*A. citri*) occurs in that country upon citrus plants practically wherever they grow, even in localities where citrus grows in the jungle. It was found to be under control, however, the concomitant smut fungus being discovered in but one instance. The natural enemies discovered, and supposed to be responsible for holding this pest in check, are *Ægerita webberii*, the smut fungus that occurs in Florida; two coccinellid beetles (*Verania cardoni* and *Cryptognatha flavescens*); and the aphelininid parasite *Prospaltella lahorensis*, here described as new to science.

Notes on the biology of the cochylis (Cochylis ambiguella) and eudemis (Polychrosis botrana) moths, M. F. PICARD (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 25, pp. 1792–1794*).—This article consists of brief notes on the appearance of adults in spring in the Department of Herault, and their feeding habits and reproductive capacity.

Annual reports of the Royal Sericultural Station, Padua (*Ann. R. Staz. Bacol. Padova, 37 (1910), pp. 117, figs. 6; 38 (1911), pp. 160, pls. 6, figs. 6*).—These reports contain papers by E. Verson and E. Bisson and by E. Quajat on the silkworm and silk culture. Bibliographies of the literature relating to sericulture that were published during the years 1908–9 (pp. 99–117) and 1909–10 (pp. 135–159), respectively, and here presented, were prepared by E. Bisson.

Illustrations of diurnal Lepidoptera, A. G. WEEKS, Jr. (*Boston, 1905, vol. 1, pp. XII+117, pls. 45; 1911, vol. 2, pp. XVI+37, pls. 21*).—Volume 1 of this work consists of colored plates and descriptions of 81 species, largely from Bolivia, which the author has found to be new to science. An account by W. J. Gerhard of a 60 weeks' collecting trip in that country is incorporated in the work.

Volume 2 is confined to descriptions and colored plates of species taken in the neighborhood of Suapure River in Venezuela. A list of the scientific writings of W. H. Edwards is included.

The importation into the United States of the parasites of the gipsy moth and the brown-tail moth: A report of progress with some consideration of previous and concurrent efforts of this kind, L. O. HOWARD and W. F. FISKE (*U. S. Dept. Agr., Bur. Ent. Bul. 91, pp. 312, pls. 28, figs. 74*).—In the first part of this detailed report the authors consider previous work in the practical handling of natural enemies of injurious insects, early ideas on introducing the natural enemies of the gipsy moth, the circumstances which brought about the actual beginning of the work, the known and recorded parasites of the gipsy moth and brown-tail moth, establishment and dispersion of the newly introduced parasites, disease as a factor in the natural control of the gipsy and brown-tail moths, studies in the parasitism of native insects, and parasitism as a factor in insect control.

Attention is next given (pp. 109–131) to the gipsy moth, its rate of increase in New England, the amount of additional control necessary to check its increase in America, the extent to which it is controlled through parasitism abroad, and the sequence of its parasites in Europe. Then follow accounts (pp. 132–168) of the brown-tail moth and its parasites in Europe, parasitism of the gipsy and brown-tail moths in America, the importation and handling of parasite material, and the quantity and localities from which the parasite material has been received.

The remainder of the bulletin is largely devoted to specific consideration of the various parasites and hyperparasites of the 2 moths. The bulletin closes with a summarized account of the present status of the introduced parasites and of developments of the year 1910.

Formalin poison for flies, R. I. SMITH (*Bul. N. C. Bd. Health, 26 (1911), No. 2, p. 71*).—The author has used milk with formalin, at the rate of 16 oz. of equal parts milk and water to 1 oz. of formalin, with excellent results. This mixture is said to attract flies much better than when the formalin is used in sweetened water.

Control of the apple maggot by picking up drops, W. C. O'KANE (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 173–179, figs. 4*).—A more detailed account of the author's investigation on the subject than that previously noted (E. S. R., 25, p. 356).

The apple maggot or "railroad worm," W. C. O'KANE (*New Hampshire Sta. Circ. 14, pp. 4, figs. 2*).—This circular, based on investigations previously noted (E. S. R., 25, p. 356), calls attention to the methods by which the infestation of the apple maggot can be checked.

Contamination of the fly with poliomyelitis virus, S. Flexner and P. F. Clark (*Jour. Amer. Med. Assoc., 56 (1911), No. 23, pp. 1717, 1718*).—Experiments conducted with a view to determining whether or not the house fly carries the infection of this disease are here reported. They "show that flies contaminated with the virus of poliomyelitis harbor the virus in a living and infectious state for at least forty-eight hours. They do not show that this is the limit of the period of survival, and they throw no light on the question whether the virus is retained merely as a superficial contamination or whether it can survive in the gastro-intestinal tract. Experiments relating to these points are in progress."

The mosquitoes, R. Blanchard (*Les Moustiques.—Histoire Naturelle et Médicale. Paris, 1905, pp. XIII+673, table 1, figs. 316*).—The 7 chapters of this work take up the subject as follows: (1) Description and place of mosquitoes in zoological classification (pp. 1–43), (2) anatomy (pp. 44–67), (3) habits and metamorphosis (pp. 68–135), (4) systematic study, with descriptions of the genera and species (pp. 136–430), (5) mosquitoes as pathogenic agents (pp. 431–548), (6) general prophylaxis (pp. 549–599), and (7) the collection and study of mosquitoes, including means of preparation and preservation (pp. 600–618).

The species and genera recently described are listed in an appendix (pp. 619–635). The work also includes a bibliography of 23 pages and an index.

Papers on deciduous fruit insects and insecticides.—Vineyard spraying experiments against the rose-chafer in the Lake Erie Valley, F. Johnson (*U. S. Dept. Agr., Bur. Ent. Bul. 97, pt. 3, pp. 53–64, pls. 4, figs. 6*).—Following a brief introduction and account of the habits of the adult and larva, the author considers remedial measures at some length, particularly spraying experiments conducted at Northeast, Pa., and observations of spraying operations at other points in the Lake Erie Valley. He states that his observations with the use of a sweetened arsenical do not justify the recommendation of its general use. Experiments during the season of 1910 indicate that a very thorough application of arsenate of lead when the beetles appear, just before the blossoms open, will reduce its destructiveness to the extent that a profitable crop of fruit can be secured even in vineyard areas where this insect abounds in destructive numbers.

Papers on insects affecting stored products, F. H. Chittenden (*U. S. Dept. Agr., Bur. Ent. Bul. 96, pt. 3, pp. 29–52, figs. 4*).—Accounts are given of the lesser and larger grain-borers.

The lesser grain-borer (*Rhizopertha dominica*) (pp. 29–47).—This beetle is cosmopolitan, attacks different cereals and several other substances, and is of considerable economic importance, especially in warm and tropical regions. It has already obtained a footing in this country and is frequently brought here from outside sources in stored cereals and other seeds and similar material. So far as known it appears to prefer grain to other dry products but shows an inclination to be omnivorous, feeding also upon drugs and boring into the wood of packing boxes and casks.

The species was described by Fabricius in 1792 from specimens collected in South America. According to published records, it is, or at least was for years, most injurious in India; it is thought to be safe to assume that it came originally from India or from some adjacent tropical country. In Europe it is seldom found outside of London, Trieste, and a few other large seaports. Its abundance in London is attributed to the large quantities of grain that were brought from India to that port. In the United States it seems to be well established in some southern ports but to have a more or less insecure footing northward, except in large seaports, like New York City. A list of localities from which it has been reported in this country includes New York City, Brooklyn, N. Y., Washington, D. C., Chicago, Ill., Keokuk, Iowa, Charleston, S. C., Atlantic County, N. J., Philadelphia, Pa., Arizona, and Canada. It has also been recorded from Vera Cruz, Mexico, Belize, Honduras, Cuba, Hawaii, Madeira, and Algeria.

In experiments with carbon bisulphid and hydrocyanic-acid gas from sodium cyanid, by D. K. McMillan; with hydrocyanic-acid gas from sodium cyanid, by M. M. High; and with carbon bisulphid, by Messrs. Popenoe and Jones and the author, it was found that the lesser grain-borer possesses less resistant power to both gases than do most other stored-product insects; that fumigations in low temperatures, and especially below 50° F., are practically ineffective unless an excessively large amount of bisulphid of carbon or of a cyanid be used; and that it is still more desirable that from 48 hours to 3 days be the length of exposure in order to kill all insects in even tight inclosures. One experiment showed that even with 10 lbs. of bisulphid of carbon to 1,000 cu. ft. of space in a tight receptacle only a very small percentage of grain insects were killed in an exposure of 24 hours and with a temperature of about 48° F., and another that even with 20 lbs. of carbon bisulphid to 1,000 cu. ft., or 10 times what may now be accepted as a standard, only 75 per cent of the insects present were destroyed in a 24-hour exposure.

The author concludes that it may be safely assumed that under ordinary conditions, in temperatures between 65 and 75° F., 1½ lbs. of bisulphid of carbon to 1,000 cu. ft. of air space is insufficient even for 48 hours' exposure, and that as a general standard 2 lbs. to 1,000 cu. ft. for 48 hours or more, or until the odor of the gas has become entirely dissipated, may be adopted.

A bibliography of 21 titles is appended.

The larger grain-borer (*Dinoderus truncatus*) (pp. 48–52).—So far as the author knows, this species has never found permanent lodgment in the United States, but is apt to be introduced into tropical Texas as well as elsewhere. It is tropical, and though a general feeder, at least in its adult stage, is by virtue of its large size apparently restricted in cereals to maize.

This beetle was first described in 1878 from specimens accidentally found in California. It was also accidentally brought to this country with corn for exhibition in the Mexican section of the New Orleans Exposition in 1885, and in 1893 specimens were obtained in corn and edible roots from the Mexican and Guatemalan exhibits at the World's Columbian Exposition, at Chicago. It has since been received in stored corn from Tlaxiaco, State of Oaxaca, and from Parral, Province of Chihuahua, Mexico.

The author finds that the pupal stage varies from about 4½ days in the very hottest weather to 6 days in a little cooler weather during June and July, while in October the pupal period lasted 12 days, from October 17 to 29. The entire life cycle from the placing of beetles in corn until the issuance of the new generation occupied 45 days, from August 25 to October 9.

A bibliography of 5 titles is included.

The bulb mite, F. Windle (*Jour. Econ. Ent., 4* (*1911*), *No. 1, pp. 127, 128*).—The bulb mite *Rhizoglyphus hyacinthi* (*echinopus*), also known as the "Eucharis Mite," has been found to be the source of considerable injury to bulbs imported from France, Holland, and Japan.

The taxonomic value of the microscopic structure of the stigmal plates in the tick genus Dermacentor, C. W. Stiles (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 62, 1910, pp. 72, pls. 43, fig. 1*).—Eleven species of Dermacentor are considered, 2 being described for the first time.

The sugar-cane insects of Hawaii, D. L. Van Dine (*U. S. Dept. Agr., Bur. Ent. Bul. 93, pp. 54, pls. 4, figs. 5*).—In this bulletin the author has brought together information on the Hawaiian sugar-cane insects. Particular attention is given to the biology of, and remedial measures for, 4 of the more important pests, namely, the sugar-cane leafhopper (*Perkinsiella saccharicida*), the Hawaiian sugar-cane borer (*Rhabdocnemis* [*Sphenophorus*] *obscurus*), the Hawaiian sugar-cane leaf-roller (*Omiodes accepta*), and the sugar-cane mealy bug (*Pseudococcus calceolariæ*). Brief mention is made of miscellaneous insects and rats injurious to sugar cane in Hawaii.

Papers on insects affecting stored products, F. H. Chittenden (*U. S. Dept. Agr., Bur. Ent. Bul. 96, pt. 2, pp. 19–28, figs. 4*).—Descriptions of the broad-nosed grain weevil and the long-headed flour beetle are presented.

The broad-nosed grain weevil (*Caulophilus latinasus*) (pp. 19–24).—This weevil, first described from Florida in 1831, appears to be permanently established as an enemy of dried cereals and other food materials in the United States, having been recorded or received from Georgia and South Carolina as well as Florida, and from Jamaica, Porto Rico, Mexico, Guatemala, and Madeira.

A bibliographical list of 14 titles is included.

The long-headed flour beetle (*Latheticus oryzæ*) (pp. 25–28).—This beetle was first described in 1880, having been found in rice from Calcutta and elsewhere, including England, and being also known from Arabia, Norway, Italy, and from a London granary in samples from Bussorah, Persia, and Odessa, Russia. Quite recently it has been introduced into this country, having been collected at Houston, New Braunfels, San Antonio, Galveston, Fort Worth, Lyons, Wichita Falls, and Dallas, Tex., and Detroit, Mich. Thus it is established in Texas, and probably in Michigan, and bids fair to become a pest in time.

A bibliographical list of 10 titles is given.

Need of national control of imported nursery stock, C. L. Marlatt (*U. S. House of Representatives, 61. Cong., 3. Sess., Rpt. 1858, pp. 7–16; Jour. Econ. Ent., 4 (1911), No. 1, pp. 107–124*).—This paper treats of the plant diseases and insect pests that have been introduced into the United States, of the immense expense attending the efforts of the Federal Government and the States to combat them, and of the history of legislation on the subject.

New York nursery inspection, G. G. Atwood (*Jour. Econ. Ent., 4 (1911), No. 1, pp. 99–103*).—A discussion of the history and manner of nursery inspection in New York State.

The effect of certain gases and insecticides upon the activity and respiration of insects, G. D. Shafer (*Jour. Econ. Ent., 4 (1911), No. 1, pp. 47–50*).—A brief of results obtained in investigations conducted with a view to determining the way in which insects are killed by contact with insecticides.

Some properties that make lime-sulphur wash effective in killing scale insects, G. D. Shafer (*Jour. Econ. Ent., 4 (1911), No. 1, pp. 50–53*).—This is an abstract of a paper presented at the twenty-third annual meeting of the American Association of Economic Entomologists.

FOODS—HUMAN NUTRITION.

Food and the principles of dietetics, R. Hutchison (*New York, 1911, 3. ed., pp. XX+615, pls. 3, figs. 32*).—The author states that the whole volume (E. S. R., 17, p. 1097) has been thoroughly revised and that the chapters dealing with the use of diet in disease have been considerably enlarged. A new chapter has been added on certain dietetic cures and systems.

Wheat studies, E. F. Ladd (*North Dakota Sta. Rpt. 1910, pp. 24–31*).—The milling and baking tests summarized have been noted from other publications (E. S. R., 24, pp. 67, 262, 263).

The utilization of the whole grain for food purposes, D. Finkler (*Jour. Roy. Inst. Pub. Health, 19 (1911), No. 4, pp. 193–199, pls. 2*).—In this article the author summarizes data regarding his process for grinding bran in such a way that the cell walls are ruptured and the cell contents made available, and reports experiments establishing the digestibility of breads prepared with the addition of varying quantities of the special bran flour obtained (E. S. R., 23, p. 369). The conclusion reached is that such breads are as well assimilated as ordinary breads and that therefore the bran flour ground by the special wet method is well digested.

Concerning German grains—the baking quality of rye and wheat flour, M. P. Neumann and K. Mohs (*Ztschr. Gesam. Getreidew., 2 (1910), Nos. 8, pp. 187–191; 9, pp. 208–215; 10, pp. 231–238*).—A large number of varieties of wheat and rye are included in this comparative study, in which the influence of fertilizers is taken into account as well as other factors. In the case of rye flour, the conclusion is reached that the protein content has even less effect on baking quality than in the case of wheat flour. In general, the conclusions have to do with the varieties most satisfactory for local agricultural conditions.

Bacterial leaven of salt-rising bread, H. A. Kohman (*Nat. Baker, 14 (1909), No. 164, pp. 39–41*).—From his studies the author concluded that the leavening agent in salt-rising bread fermentation is a bacterium and not a yeast.

The fermentation in salt-rising bread "is quite different from yeast fermentation. For every pound of carbon dioxid produced by yeast there is something more than a pound of alcohol produced, while the bacterial fermentation in salt-rising bread is nonalcoholic."

He succeeded in isolating the bacterium in pure culture, and states that the organism can be propagated without any difficulty. He also states that he has prepared it for use by growing it in milk and then adding the milk to the sponge and also by making a batter with fermented milk and flour. "This batter when dried can be used as a starter, and then the ordinary method can be followed. A very small quantity of the starter is sufficient to set up a vigorous fermentation."

[Bread making studies]—report of association fellowship student at University of Kansas, H. A. Kohman (*Nat. Assoc. Master Bakers [Proc.], 13 (1910), pp. 29–37, fig. 1*).—Experimental studies led to the conclusion that the addition to dough of some saccharin material such as sugar and malt extract is justifiable, and that "very often when the yeast works slowly, especially toward the end of the fermentation period, when it is most essential that the bread rises well, it is due to the lack of these."

The activity of several sorts of malt extract was tested and the amount of sugar determined in breads made with the addition of cane sugar, malt extract, and cooked flour, and in bread made without any such additions. Nearly as much sugar was found in the bread made with ½ per cent malt and 3½ per cent cooked flour as in that made with 2½ per cent cane sugar. This the author attributes to the fact that gelatinized starch is a favorable medium for the development of the yeast plant. His experiments led him to conclude that many starch granules of the flour remained intact even after the bread was baked.

"While the use of malt extract in bread making has its advantages, it certainly becomes necessary to exercise more care than when sugar is used." Not more than 1 per cent of malt extract, especially if strong, is needed, too much resulting in a sticky dough of dark color. "The amounts that can be successfully used depend both upon the strength of the flour and the activity of the extract. With a weak flour one must use low diastatic extracts, while with stronger flours one may use larger quantities or extracts with a greater digestive power."

The effects of the addition of acids, enzyms, and 2 sorts of bacteria isolated from flour were studied with a view to determining their effect when normally present in doughs. "Proteolytic enzyms had a very marked effect upon the gluten when introduced into a dough. They had to be used in very small quantities or the dough would become runny and sticky. As little as one part to 4,000 parts of flour produced a noticeable effect, and when used in larger quantities it was decidedly harmful. While it was not possible to improve bread by adding them, the experiments did show, however, why flours that had germinated and certain malt extracts with a high proteolytic power are not suitable for making bread. Acids, when added to a dough, have a marked 'shortening' effect upon the gluten, and up to a certain strength, depending upon the flour, they shorten the period of fermentation somewhat. In excess, they are decidedly harmful, for they weaken the flour and produce bread which resembles that made with impure yeast."

In no case did the bacteria studied retard the action of the yeast. "In all cases they had a 'shortening' effect upon the gluten, and hence shortened somewhat the period of fermentation. In general, the bread made by the addition of bacteria was smaller in volume and closer grained, approaching more nearly homemade bread."

The studies with salt-rising bread noted above were continued. The author found that with this method of bread making the losses were 0.46 per cent as compared with 1.81 per cent in the case of yeast bread put into pans at once upon mixing the dough, and 5.15 per cent in yeast bread normally fermented. The greater loss in yeast bread is in part due to the longer fermentation period required.

In salt-rising bread, according to the author, no alcohol is produced, and nearly two-thirds of the gas produced is hydrogen. He states that the method of making salt-rising bread with pure cultures of the bacterium isolated has given satisfactory results on a commercial scale.

In connection with an attempt to devise a method of saving stale bread, experiments were made to see whether it could not be used in place of cooked flour in bread making to improve the yeast growth. The bread was ground, cooked with about 5 times its weight of water, cooled to about 131°, and submitted to the action of malt extract. The starch was first liquefied and then converted for the most part into sugar and dextrin, the gluten remaining in small flakes. It was proposed to use the sugar thus formed as part of the liquid in the next day's baking instead of cane sugar or malt extract. The separated gluten when dried, the author considers, may have some value as a diabetic food or for some similar purpose.

[Maize starch product in bread making], A. P. PFEIL (*Nat. Baker, 14 (1909), No. 161, pp. 54, 56*).—Preliminary experiments are reported on the value of gelatinized starch, in connection with small quantities of malt extract, in bread making to insure vigorous growth of the yeast, which depends in large measure upon an abundance of sugar or sugar-yielding matter.

Analyses of banana flour, J. A. BERTHET (*Bol. Agr. [Sao Paulo], 12. ser., 1911, No. 2, pp. 127, 128*).—Analyses of 2 samples are reported.

Chestnut flour, G. LEONCINI and C. MANETTI (*Staz. Sper. Agr. Ital., 44 (1911), No. 1, pp. 66–83*).—Analyses are reported of 8 samples of chestnut flour, and its nutritive value discussed.

Peculiar spoiling of Brazil nuts, KÜHL (*Pharm. Zentralhalle, 51 (1910), No. 6, p. 106; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 10, pp. 629, 630*).—The spoiled nuts showed the presence of *Aspergillus* *flavus*, which the author points out is poisonous. The presence of this fungus has a possible importance since the nut is so largely used by vegetarians.

Very young veal as food, L. HANSOULLE (*2. Cong. Internat. Hyg. Aliment., Bruxelles* [*Proc.*], *1* (*1910*), *Sect. 3, pp. 121–126*).—From a summary of data the author concludes that the sale of very young veal should be prohibited. The nutritive value of such veal, he points out, is extremely low, 60 per cent of the dry matter consisting of extractives and gelatinoids. Moreover, it has laxative properties, and is handled and marketed under conditions which the author believes promote disease.

Analyses of sour milk curd, R. WINDISCH (*Kisérlet. Kozlem., 14* (*1911*), *No. 2, pp. 167, 168*).—The analytical data reported are based on the analysis of a large number of samples. Such cottage cheese is much used in Hungary seasoned in various ways, and also in the preparation of a number of dishes.

Damaged coffees, D. CRISPO and PIRARD (*2. Cong. Internat. Hyg. Aliment., Bruxelles* [*Proc.*], *2* (*1910*), *Sect. 4, pp. 192–194*).—Du Santos coffee of good quality was studied under conditions resembling those which prevail when coffee is injured by rain or by soaking in sea water, and the composition of the treated berries compared with that of normal coffee berries. Attempts were also made to improve and utilize the damaged coffee after roasting it at a temperature of 250°.

According to the authors, coffee soaked in fresh water undergoes alcoholic fermentation; then it becomes moldy and changes color, turning green and then black, the final discoloration being attributable to a zymase (laccase). The loss of solid substance amounts to 11.1 per cent. If decomposition is arrested promptly the coffee can be used and is harmless. If the changes are more pronounced, the decoction has an undisguisable musty taste and the peculiar coffee flavor is lost. Coffee soaked in sea water undergoes greater and more undesirable changes.

Composition of some genuine wine from the Province of Florence, R. SALVADORI and A. MAZZARON (*Bol. Min. Agr., Indus. e Com.* [*Rome*], *10* (*1911*), *Ser. C, No. 5, pp. 43–47*).—Fifty-four analyses are reported and discussed.

The keeping quality of vinegar, G. JORGENSEN (*2. Cong. Internat. Hyg. Aliment., Bruxelles* [*Proc.*], *2* (*1910*), *Sect. 4, pp. 9–12*).—It was found in a study of the acetic acid content and appearance of 20 samples of vinegar, kept from 7 to 17 months, that, in general, the loss of acid was insignificant and the change in appearance small. When the acid content was noticeably lowered the vinegars lost their clearness, and in some cases were viscous and unattractive. Such qualities, when found in weak vinegar, the author attributes to spontaneous changes. If, on the other hand, the vinegar is clear, its weakness may be due to dilution with water or to the action of micro-organisms which have been removed by straining.

Tomato catsup, A. McGILL (*Lab. Inland Rev. Dept. Canada Bul. 224, pp. 9*).—Results are reported of an examination of a large number of samples of tomato catsup collected in different parts of Canada.

Austrian food code (*Codex Alimentarius Austriacus. Vienna, Govt., 1911, vol. 1, pp. XIV+461*).—This important volume contains definitions and sepcifications for food materials, beverages, and petroleum, together with a summary of legislative enactments and similar material, and as a whole is the official source of information regarding the examination and valuation of food and certain other products in Austria. A large number of experts have participated in the preparation of material for the codex. The preface is by F. W. Dafert, who is the head of the commission having the work in charge, and there is also an historical introduction explaining the development and extent of the Austrian work with respect to valuation and the suppression of adulteration and sophistication of foods and other materials. The present codex is the outgrowth and completion of an enterprise begun under different auspices a number of years ago.

Analyses and inspection work at the agricultural-chemical, experimental, and food laboratory at Vorarlberg in Bregenz in 1910, J. M. Krasser (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 4, pp. 582–591*).—Information is given regarding the character and extent of the analytical and inspection work carried on. Analyses of commercial soup flavorings are reported and information given regarding the food inspection work, regulations governing the sanitary handling and marketing of foodstuffs, and the inspection of fertilizers.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decision 138, p. 1*).—This decision, which has to do with saccharin in food, is a modification of Food Inspection Decision No. 135 (E. S. R., 25, p. 368).

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 895, pp. 3; 896–897, p. 1 each; 898, pp. 2; 899, p. 1; 900, pp. 16; 901, pp. 2; 903–904, pp. 2 each; 906, p. 1; 907–910, pp. 2 each; 911–912, p. 1 each; 915–919, pp. 2 each; 920, p. 1; 921, pp. 2; 922, p. 1; 924–927, pp. 2 each; 928, pp. 3; 929–934, pp. 2 each; 935, p. 1; 936–937, pp. 2 each; 938, p. 1; 939, pp. 4; 940–946, pp. 2 each; 947–948, p. 1 each; 949, pp. 2; 950, pp. 16; 951, pp. 2; 952, p. 1; 953–954, pp. 2 each; 955–957, p. 1 each; 958–960, pp. 2 each; 961, p. 1; 962, pp. 2; 963–964, p. 1 each; 965, pp. 2; 966, p. 1; 967–970, pp. 2 each; 971–974, p. 1 each; 975–978, pp. 2 each; 981, p. 1; 982–983, pp. 2 each; 984, p. 1; 985–986, pp. 2; 987, pp. 3*).—These notices of judgment have to do with the misbranding of coffee, pork and beans, drug products, Maraschino cherries, lemon flavor, Harris's lithia water, evaporated apples, flour, preserves, "matzos." "pineapple" oranges, lemon extract, Buckhead lithia water, olives, a food product ("Crown glossine"), "figprune cereal," and headache tablets; the adulteration of ice cream cones, tomato pulp, Jamaica ginger compound, tomato catsup, frozen eggs, tomato ketchup, shelled peanuts, evaporated peaches, prunes, coffee, confectioners' brown glaze, and eggs; the adulteration and misbranding of a drug product, tomato catsup, olive oil, vinegar, blackberry cordial, maple sirup, spirits turpentine, vanilla flavor, "Vani-Kola compound sirup," Jamaica ginger and flavoring extracts (peppermint and wintergreen), flavoring extracts (vanilla, lemon, and strawberry), evaporated apples, coffee, "salad oil," "true eggs substitute," tomato paste, vanilla extract, and cider vinegar; the alleged misbranding of "flavor of lemon and citral;" the misbranding and alleged adulteration of vinegar; the adulteration and alleged misbranding of evaporated apples; and the alleged adulteration and misbranding of olive oil.

The influences on the digestive processes of different beverages taken during meals, Ide (*2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 1 (1910), Sect. 2, pp. 23–29*).—From investigations carried on in the author's laboratory, he concludes that except in cases of abnormal digestion or of toxic beverages the influence of beverages on digestion is ordinarily much exaggerated. Liquids taken in ordinary amounts may lessen the acidity of the gastric contents for a short time, but the effect is too small to be important. Tea and coffee the author regards as stimulants to the secretion of digestive juices. Milk is separated into water and curd as soon as it reaches the stomach, and its liquid therefore affects digestion no more than does water. In most beverages of acid and alkaline properties the latter are so feeble that they intensify or neutralize the acidity of the gastric contents to only a very slight degree. In the opinion of the author the question of whether beverages are appetizing is more important to persons in health than their chemical nature.

The biological rôle of potassium, E. Biernacki (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 6 (1911), No. 10, pp. 401–407*).—The data reported have to do with the effect of diet on the excretion of potassium. According to the author, the excretion is greater on a diet rich in protein and poor in carbohydrates than on one in which these conditions are reversed.

The relation between potassium excretion and sodium is also considered. See also a previous note (E. S. R., 25, p. 67).

A critical study of the process of acid excretion, L. J. Henderson (*Jour. Biol. Chem., 9 (1911), No. 5, pp. 403–424, dgms. 3*).—As is the case with temperature and osmotic pressure, normal neutrality or alkalinity, the author concludes, is adjusted by a mechanism within the body, but is maintained permanently by exchanges with the environment.

"The acid end products of metabolism, without appreciably changing the actual alkaline reaction constantly take up alkali from blood and protoplasm. In this manner there is a tendency to disturb the normal protective equilibrium between bases and acids. This tendency is held in check by the kidney, which in the process of urine formation reverses the reaction of neutralization of acid and restores to the blood that alkali which has served as a carrier of acid.

"The process may be measured both quantitatively and in respect to its efficiency. The quantity of acid excreted is measured by the amount of alkali which must be added to urine in order to obtain the reaction of blood plus the amount of urinary ammonia."

A method for carrying out such measurements is described.

According to the author's investigations "the preservation of the normal alkalinity of the body is due, in important measure, to but two independent factors, excretion of ammonia and excretion of phosphates. The elaboration of ammonia and the presence of phosphoric acid as an end product of metabolism make possible the excretion of acid; regulation of ammonia production and of the ratio of the acid to the alkaline phosphates of urine are the means of regulating the acid excretion."

The pressor bases of the urine—the effect of age, diet, and high blood pressure on their excretion, W. Bain (*Lancet [London], 1911, I, No. 21, pp. 1409–1411, figs. 3*).—Pressor bases—that is, substances which raise the arterial blood pressure of animals when injected intravenously—are absent from the urine of children from 10 to 12 years of age and apparently begin to be excreted at about the age of 14.

"A vegetable diet considerably reduces the amount formed. Eggs and fish reduce the quantity to some extent, but if chicken is taken the amount is but little less than one obtains on an ordinary mixed diet containing butcher's meat.

"The bases are either absent or considerably diminished in cases of high blood pressure. Doubtless the diminution in some cases is partially attributable to low dietary, but in most of the cases recorded in this paper the only possible explanation is that the bases are retained in the system and produce the rise in pressure.

"In gouty patients with normal blood pressure the pressor bases are excreted in normal amounts."

Methods of studying diet in different classes of society, P. Albertoni and P. Tullio (*2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 1 (1910), Sect. 1, pp. 130–168*).—Methods for conducting dietary studies and related work are outlined and results of the investigation of Albertoni and Rossi summarized (E. S. R., 25, p. 266).

The energy value of food materials and dietary standards, H. Koettlitz *2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 1 (1910), Sect. 1, pp. 23–33*).—From a summary of data the author concludes that the conflicting results obtained by the various investigators indicate clearly that nutritive requirements vary with individuals and with the same individual under different conditions, and that the prescription of a diet, like the practice of medicine, is therefore an art rather than an exact science.

Diet of the white man in the Congo, Dryepondt (*2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 1 (1910), Sect. 2, pp. 66–78*).—Many questions which concern the selection and preparation of food, the character of the diet which is desirable, etc., are discussed. The author believes that in tropical regions generous amounts of meat combined with a moderate amount of vegetables should be used, since animal foods require less expenditure of energy for their digestion and assimilation, while, on the other hand, vegetable foods increase a tendency to diarrhea and dysentery. The natives, he states, live on a vegetable diet in times of peace, but use animal foods when engaged in warfare. Similarly, when they are hired to perform fairly severe work for Europeans, it has been found necessary to give them meat. Much information is summarized regarding the character and food qualities of native food materials.

A campaign ration, J. B. E. Haeffelé (*2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 2 (1910), Sect. 7, pp. 38–41*).—French army rations are discussed, and suggestions made regarding the use of less bulky rations when on the march or in the field.

Diet in Belgian prisons, H. Vandeputte (*2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 1 (1910), Sect. 2, pp. 37, 38*).—The amount of nitrogen and carbon supplied in central and secondary prisons in Belgium is calculated. Though doubtless adequate, the diets are not regarded as satisfactory, owing to their extreme simplicity and monotony. Some method for introducing variety is advocated, such as possibly the purchase of additional materials at the prison canteen.

Dietaries in Belgian prisons, F. Dauwe (*2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 1 (1910), Sect. 2, pp. 49–65*).—The winter and summer diet of the central prisoners, according to the author's summary, supply, in round numbers, 138 and 129 gm. protein per day, respectively, with an energy value of 3,390 and 3,320 calories. Similar values for the winter and summer diet of the secondary prisoners are 120 and 111 gm. protein and 3,225 and 3.131 calories. These figures represent food as purchased. Attention is drawn to the monotonous character of the diet, and some suggestions are made for improvement.

The diet of prisoners, Delmarcel (*2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 1 (1910), Sect. 2, pp. 39–48*).—According to the author's summary, the diet in Belgian central and secondary prisons supplies about 100 gm. protein and from 2,800 to 2,900 calories per day.

The proportion of wages spent to cover the expenditure of the body during the performance of a definite amount of mechanical work, A. M. Imbert (*2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 1 (1910), Sect. 1, pp. 173, 174*).—The author concludes that about 1/15 of the daily income (80 cts. in round numbers) was spent for the portion of the food which provided the energy (900 calories) expended in mechanical work performed by the subject under investigation.

The energy problem in living organisms, G. Fano (*2. Cong. Internat. Hyg. Aliment., Bruxelles [Proc.], 1 (1910), Sect. 1, pp. 15–17*).—A critical discussion of body energetics.

The possibility of increasing the working power of muscles by training, E. Palmén (*Skand. Arch. Physiol., 24 (1910), No. 2–4, pp. 168–186, dgms. 3*).—The results of an extended study showing the beneficial effects of training are reported, in which the work consisted in raising a weight.

The effect of different variables upon fatigue, E. Palmén (*Skand. Arch. Physiol., 24 (1910), No. 2–4, pp. 197–225, dgms. 5*).—The investigations have to do with the work noted above.

The energy problem from the standpoint of muscular work and intellectual work, H. Renauld (*2. Cong. Internat. Hyg. Aliment., Bruxelles* [*Proc.*], *1* (*1910*), *Sect. 1, pp. 11–14*).—According to the author's summary, the same general laws which govern muscular work hold also for mental work.

The brain, he concludes, is subject to osmosis, as are the other organs of the body. As the muscle cells when they become active utilize some form of carbohydrate, so the cerebral cells utilize a special substance, chromatin. Morphological changes corresponding to those in the glandular cells which produce external secretions also take place in the cortical cells according as the latter are in a state of psychic activity or repose. Psychic activity, like muscular activity, occasions an increased flow of blood through the organ and an increase in waste products, as is shown by the highly toxic character of the urine in subjects performing severe intellectual work. But whereas in the case of muscular activity the chemical reactions and heat liberation can be localized and measured in the muscle itself, this has not yet been done in the case of intellectual activity. In the latter not one set of cells, but probably the entire neuro-muscular system, is called into play. In short, while it has been demonstrated that the law of the conservation of energy holds in mental work, it has up to the present time been impossible to measure the exchanges which accompany it.

Calorimetry with human subjects, G. Weiss (*2. Cong. Internat. Hyg. Aliment., Bruxelles* [*Proc.*], *1* (*1910*), *Sect. 1, pp. 34–44*).—A historical and critical survey.

Friction in the bomb calorimeter, H. A. Roesler (*Amer. Chem. Jour., 44* (*1910*), *No. 1, pp. 80–84; abs. in Chem. News, 103* (*1911*), *No. 2667, pp. 2, 3*).—A method for determining the heating effect due to the friction of the stirrer in bomb calorimetry work was evolved, and the results of a number of determinations reported. The magnitude of the rate of rise in temperature, due to such friction, does not affect the accuracy of the heat determinations, according to the author, provided it is uniform throughout the time of the determination.

ANIMAL PRODUCTION.

Breeding farm animals, F. R. Marshall (*Chicago, 1911, pp. 287, figs. 49*).—As stated in the preface, "the main object of this book is to direct attention away from profitless speculations that have necessarily characterized some earlier books, and to stimulate interest in the more tangible, the physical basis of heredity. . . . It has been the aim to limit discussion to points upon which scientific opinion is quite well agreed, though this has not been altogether possible."

In the chapters on "germ cells," "the offspring during gestation," and "Mendel's law" will be found such information as the author has gleaned from the biological field that is of value to the practical breeder. The author shows that a scientific study of the physical aspects of heredity lead to conclusions that are in accord with the teachings of the men who have produced the best types of horses, cattle, sheep, and swine. Among the chapters devoted to the practical side of breeding are the following: Pedigrees of breeding animals, foundation and management of a breeding business, and breeding associations.

On the interrelations of genetic factors, W. Bateson and R. C. Punnett (*Proc. Roy. Soc.* [*London*], *Ser. B, 84* (*1911*), *No. B 568, pp. 3–8*).—Results obtained with plants examined in the light of the presence and absence hypothesis showed two distinct conditions, first, a system of partial coupling under which two factors are generally associated, and a system of complete repulsion (spurious allelomorphism). Further work showed that there had been a repulsion in one case between the same two factors which had been coupled in another case. The authors come to the conclusion that if A, a, and B, b, are two allelomorphic pairs subject to coupling and repulsion the factors A and B repel each other in the gametogenesis of the double heterozygote resulting from the union Ab × aB, but will be coupled in the gametogenesis of the double heterozygote resulting from the union AB × ab. The F_1 heterozygote is ostensibly identical in the two cases, but its offspring reveals the distinction. The possible significance of coupling and repulsion for breeding operations is discussed.

Under a given system in which a pair of factors are coupled it is possible to produce repulsion by breeding together the rarer terms of the coupled series, namely, Ab and aB, but the authors see no way to construct a coupling system for the repelling system in the absence of a fresh variation. "This consideration has an obvious application to those cases in which sex operates as a repelling factor. In the fowl, the canary, and *Abraxas grossulariata* femaleness thus acts as a repelling factor against various elements determining pigmentation, and our experience of the plants leads us to suppose that if the factors involved could be built up in the right combinations femaleness might be coupled with the factors it now repels."

"Extraordinary consequences, both to the distribution of the sexes, to the distribution of factors between them, and perhaps to the causation of fertility, must be anticipated if this condition could be fulfilled. There may be an indirect way of actually accomplishing these results. For, seeing that sex in the fowl acts as a repeller of at least three other factors, when birds are built up so as to be heterozygous for several of these, some of them may be found able to take precedence of the others in such a way as to annul the present repulsions, with subsequent coupling as a consequence."

An experiment in double mating, V. L. Kellogg (*Science, n. ser., 33 (1911), No. 855, pp. 783–789*).—A discussion of apparent aberrations in double mating of silkworm moths in work previously reported (E. S. R., 20, p. 1155).

Double mating of silkworm moths, W. E. Castle (*Science, n. ser., 34 (1911), No. 862, pp. 15–21*).—Comments on the article noted above are given, the view being expressed that double mating has produced nothing at variance with the results of single mating, but that the work under discussion demonstrates variance in dominance in common with results obtained by Couatgne and Toyama.

Measures for the protection and development of the national production of live stock (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 5, pp. 265–273*).—This contains statistical data and other information on the live-stock industry in Italy, and proposes federal measures for its promotion.

Economic importance of live-stock production, H. W. Mumford (*Amer. Breeders Mag., 2 (1911), No. 1, pp. 46–52, figs. 3*).—This contains statistics on the world's supply of live stock, and the importance of increasing the live-stock production of this country is pointed out

On the botanical and chemical composition of different varieties of hay, B. Tacke (*Fühling's Landw. Ztg., 59 (1910), No. 11, pp. 361–374; abs. in Zentbl. Agr. Chem., 40 (1911), No. 3, pp. 192–197*).—Chemical analyses are reported of samples of hay which were gathered from different places, the chief object being to compare marsh hay with that grown on the moors. The species of grasses composing the principal part of each sample of hay are enumerated.

Special feeding stuff analyses, 1911, R. E. Rose and E. P. Greene (*Fla. Quart. Bul., Dept. Agr., 21 (1911), No. 3, pp. 102–109*).—Analyses are reported of cottonseed meal, bran, middlings, ship stuff, rice flour, hominy feed, dried beet pulp, and mixed feeds.

Stock foods and feeding stuffs, E. F. LADD (*North Dakota Sta. Rpt. 1909, pp. 30, 31*).—Analyses are reported of wheat bran, shorts, middlings, mixed feeds, and stock foods.

Feeding stuffs, E. F. LADD (*North Dakota Sta. Rpt. 1910, pp. 40, 41*).—Analyses are reported of middlings, corn and oats, ground oil meal, flax bran, molasses feed, and proprietary mixed feeds.

Feeding stuffs, F. V. DARBISHIRE and W. GOODWIN (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 222–230*).—Analyses are reported of cottonseed cake, compound cake, barley dust, middlings, and fish meal.

On the use of corn cobs for feeding animals, L. DANESI and F. SCURTI (*Staz. Sper. Agr. Ital., 43 (1910), No. 3, pp. 273–282; abs. in Zentbl. Agr. Chem., 40 (1911), No. 5, pp. 358, 359*).—Analyses are reported on the nutritive value of corn cobs from different varieties of corn, and their value for feeding stock is discussed.

The conservation of products from sugar factories and distilleries, R. SARCIN (*Circ. Hebd. Syndicat Fabr. Sucre France, 1909, No. 1079; abs. in Ztschr. Ver. Deut. Zuckerindus., 1910, No. 649, II, p. 105; Zentbl. Agr. Chem., 40 (1911), No. 3, p. 212*).—A method for treating beet chips with a lactic ferment known as "lacto-pulp" is described. Successful experiments in feeding the fermented product to cattle and sheep are reported.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 902, 913, p. 1 each; 923, pp. 2*).—These relate to the adulteration of alfalfa hay and stock feeds.

Observations on rumination, E. BELZ (*Physiologische und Klinische Beobachtungen uber die Rumination. Inaug. Diss., Univ. Giessen, 1910, pp. 92; rev. in Zentbl. Biochem. u. Biophys., 10 (1910), No. 9–10, pp. 453, 454*).—The average number of movements of the jaw to masticate 1 bolus was as follows: Grown cattle, 49; calves, 60; sheep, 78; and goats, 60. The number of seconds the bolus remained in the mouth was for mature cattle 53, calves 55, sheep 61, and goats 70. Rumination began from ¾ to 1¼ hours after eating. In all ruminants there were from 4 to 6 masticating periods, lasting from 25 to 35 minutes.

The significance of the mechanical part of the energy of digestion of cattle, K. DAHM (*Biochem. Ztschr., 28 (1910), No. 5–6, pp. 456–503; abs. in Zentbl. Physiol., 25 (1911), No. 2, p. 86*).—To compare a ration rich in fiber with an easily digested ration a young bull was given a daily ration of 5 kg. of hay and 1 kg. of barley for 10 days. In the second period of the same length the ration consisted of 1.5 kg. of hay and 2.5 kg. of barley. This contained 1,086 gm. less of raw fiber than the former ration, and required 549 calories less energy. The energy required for chewing and for ruminating 1 kg. of hay was determined to be 52.3 and 41.9 calories, respectively. Eight per cent more energy was required when standing than when lying down.

On substituting a foreign fat for milk fat in feeding skim milk to calves, C. BESANA (*Staz. Sper. Agr. Ital., 43 (1910), No. 1, pp. 86–90; abs. in Zentbl. Agr. Chem., 40 (1911), No. 7, pp. 501, 502*).—Margarin and skim milk were gradually substituted for whole milk in feeding 4 calves, which made an average daily gain of 0.717, 1.23, 0.897, and 0.923 kg., respectively.

Breeding from ewes at an early age, J. MACKINTOSH (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 25–29*).—A later report of work previously noted (E. S. R., 25, p. 273). During the second year the difference in weight between the 2 lots of ewes was diminished because the earlier bred ewes lost much less in live weight than did the lot of ewes mated at 20 months of age.

The caracul breed of sheep, C. C. Young (*Amer. Breeders Mag., 2 (1911), No. 1, pp. 34–46, figs. 9*).—This is a discussion of the characteristics of the different types of Arabi or caracul breed of sheep, and on the characters of the fleece obtained from crosses with Arabi breeds, which the author thinks are superior to the imported Persian lamb skins now sold in the United States. Crosses with long wools, particularly Lincolns, have so far produced the best fleeces.

[The supply of mutton and wool to Great Britain from outside sources] (*Mark Lane Express, 105 (1911), No. 4161, pp. 875, 877, 879*).—An extract of a paper read before the Twelfth International Conference of Sheep Breeders, Norwich, England, June, 1911, in which are forecasted the probable sources of the world's future supplies of mutton and wool.

Sheep industry of New Zealand, H. D. Baker (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 189, pp. 689–695*).—A report on the growth of the present condition of the sheep industry in New Zealand.

Growing hogs in Nebraska, W. P. Snyder (*Nebraska Sta. Bul. 121, pp. 40, figs. 5*).—This bulletin reports the results of several years' work on (1) the cost of the average pig when it has reached the weight of 50 lbs., (2) the cost of keeping brood sows, and (3) the cost of growing pigs on alfalfa pasture and grain.

Twenty-four old sows, pastured during the summer on alfalfa with no grain, were fed a light ration of corn and alfalfa hay until farrowing time, at a cost of $5.19 for grain and $1.50 for alfalfa hay. The cost of feed from farrowing time until the pigs weighed 50 lbs. was $11.89, and with pasturage at $1.50 the total cost per sow was $20.08. The sows made an average gain of 56 lbs., which is credited at $3 30, making the cost per pig at the above age $2.79.

Young sows weighing about 70 lbs. each, pastured on alfalfa supplemented with a grain mixture of corn and wheat, made an average daily gain per head of 0.87 lb. It required 333 lbs. of grain, at a cost of $3.34, to produce 100 lbs. of gain. They were then put on a scant rye pasture and fed a mixture of corn, barley, and chopped alfalfa until farrowing time. On this feed they gained 0.88 lb. per head daily, requiring 455 lbs. of grain and 153 lbs. of alfalfa, at a cost of $4.56, per 100 lbs. of gain. Charging $1.50 for pasture, the total cost per sow until the pigs weighed 50 lbs. was $22.54. The sows made an average gain of 168 lbs., which is credited at $9.91, making the net cost $2.34 per 50-lb. pig.

In a similar experiment with 20 old sows in which the supplementing feed consisted of corn, wheat, emmer, and alfalfa meal, to which was added a little oil meal after farrowing, the cost per pig at 50 lbs. weight was $1.70.

Twenty-five young sows on alfalfa pasture supplemented with corn and wheat made a daily gain of 0.8 lb. each, at a cost of $3.59 per 100 lbs. gain for the grain. They were then put on a small rye pasture and fed a mixture of corn and barley, and later on corn and wheat with chopped alfalfa until farrowing time. On this ration they gained 0.95 lb. each per day, consuming 430 lbs. of grain and 138 lbs. alfalfa per 100 lbs. of gain. The pigs from these sows at 50 lbs. of weight cost $1.95 each.

In an experiment with 7 sows with fall litters the feed consisted of alfalfa pasture alone supplemented with a small amount of grain before farrowing. The grain feed after farrowing consisted of corn, wheat, and barley. The cost per pig at 50 lbs. weight in this test was $1.88. "The average results of the 5 preceding lots of hogs indicate that the cost of the 50-lb. pig was $2.13, or at the rate of $4.26 per 100 lbs. This does not include cost of labor or equipment or interest on investment."

In a series of experiments to test the cost of growing pigs on alfalfa pasture and grain, part of which has already been reported (E. S. R., 19, p. 266), 169 pigs in 5 lots, weighing from 57 to 71 lbs. each, were fed from 63 to 112 days. The grain rations consisted of various mixtures of corn, barley, and wheat, and corn alone. The pigs made an average daily gain per head of 0.8 lb., and it required 308 lbs. of grain, at a cost of $2.80, per 100 lbs. of gain. Charging pasture at from 0.3 to 0.4 ct. per head daily, the average cost per 100 lbs. gain for the 5 lots was $3.25.

In another test 198 pigs, averaging 65.4 lbs. each, were fed in 6 lots as above, except that rye was used in some of the grain mixtures. They made an average daily gain per head of 0.67 lb. and required 370 lbs. of grain, at a cost of $3.25, per 100 lbs. gain. Including pasture, the total cost per 100 lbs. gain in this test was $3.73.

In a test in which 113 50-lb. pigs were pastured on alfalfa and fed a full ration of soaked corn the daily gain per head was 0.72 lb. It required 270 lbs. grain, at a cost of $2.27, per 100 lbs. gain, and including pasture, the cost per 100 lbs. gain was $2.48. In a similar test with 97 pigs the gain was 0.51 lb., and it required 303.4 lbs. grain, at a cost of $2.55, or including pasture $2.92, per 100 lbs. gain.

The 210 pigs last mentioned were subsequently divided into 6 lots and were fed corn on alfalfa pasture, except 1 lot, which was fed mixed grain and tankage. The average daily gains per head averaged from 0.9 to 0.98 lb., at a cost, including pasturage, of from $2.54 to $4.96 per 100 lbs. gain. "A summary of these 5 years, where 792 pigs were fed various amounts of corn and other grains, indicates that the average cost of the grain and pasture for 100 lbs. of gain was $3.30."

The author states that in these experiments wheat and barley always increased the cost. In figuring the above cost data the following prices were used: Hogs 5.9 cts. per pound; corn 47 cts., wheat 70 cts., barley 40 cts., rye 56 cts. per bushel; oil meal $30, tankage $40, alfalfa meal $15, chopped alfalfa $10, and alfalfa hay $8 per ton.

On the use of dried yeast and dried potatoes for feeding horses, VÖLTZ (*Ztschr. Spiritusindus., 33 (1910), Nos. 47, pp. 579, 580; 48, pp. 588, 589; 49, pp. 600, 601; abs. in Zentbl. Agr. Chem., 40 (1911), No. 6, pp. 413–416*).—Experiments showed that rations for horses could be cheapened by substituting dried yeast and dried potatoes for about one-half of the grain ration. Feeding experiments with swine and white rats, and metabolism experiments with rats and sheep are also reported.

Draft dogs, G. LAVRIELLE (*Bul. Mens. Soc. Cent. Agr., Hort. et Acclim. Nice, 50 (1910), No. 10, pp. 354–359; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, p. 313*).—A historical and statistical account of the dog as a draft animal. At the present time about 150,000 are used for that purpose in Belgium, 10,000 of which are in Brussels and its suburbs. The value of the labor of the dogs per head and day is estimated at 50 centimes (10 cents). An average mastiff can draw a load of from 100 to 150 kg. for a distance of 12 kilometers in an hour without fatigue.

Protein concentrates for winter chickens, B. L. HARTWELL and W. F. KIRKPATRICK (*Rhode Island Sta. Bul. 145, pp. 3–40*).—This bulletin reports experiments supplementary to those previously reported (E. S. R., 20, p. 470).

To compare the effect of certain concentrates when fed to winter-hatched chicks, 7 lots, each of 35 White Wyandottes 2 weeks old, were fed a basal ration consisting of corn meal, cracked corn, mixed feed, and alfalfa, supplemented with linseed meal, gluten feed, granulated milk, or animal meal, sufficient in each case to supply an equal amount of protein. Two lots each were fed the linseed meal, gluten feed, and granulated milk rations. The phosphorus content of the ration of one each of these lots was equalized with that of the animal meal ration by the addition of bone ash, and as this caused an excess of calcium in the granulated milk ration ground limestone was added to all the other rations. The authors state that this experiment emphasizes the necessity of adding ash constituents to rations composed entirely of vegetable products, and that unless this is done development seems almost impossible with such rations. Even the ration containing granulated milk was benefited by the addition of bone ash. "Within 4 weeks the bones of the legs and breasts of the chicks which were fed the rations containing linseed meal and gluten feed, without ash, had begun to be crooked. Even with the ash constituents added these 2 concentrates were unsatisfactory."

To compare the effect of the addition of bone ash and different amounts of ground limestone to the ration 3 lots each of 14 two-weeks old Cornish Game-White Wyandotte chicks were fed the same basal ration as in the previous experiment, supplemented with cottonseed meal on an equal protein basis with the animal meal ration above. Lot 1 received no added ash constituents, lot 2 enough bone ash and ground limestone to supply phosphorus and calcium equal to the animal meal ration in the previous experiment, and the ration of lot 3 differed from that of lot 2 only in having 3 times as much limestone. The experiment was begun October 26, 1907, and by December 2 all the chicks in lot 1 had died. The chicks in lot 2 began to show signs of leg weakness December 20, and 3 afterwards died. None of lot 3 died. The experiment was concluded February 3, 1908, at which time lot 2 weighed 10.29 lbs. and lot 3 13.91 lbs. per 10 chicks.

The concentrates mentioned above and beef scrap were compared in an experiment in which the protein content of each ration was the same but the basal ration so varied that the nutritive ratio was about 1:3, except that the nutritive ratio of the linseed meal ration was lowered to 1:4 on account of stickiness of the mash, and a lot was fed a ration of beef scrap, nutritive ratio 1:4, for comparison. In addition mangel-wurzels amounting to about 30 per cent of the weight of other foods were allowed. The chicks were Rhode Island Reds, about 3 weeks old, 29 being in each lot. The live weight respectively per 10 chicks for the various lots, after 49 days, were as follows: On linseed meal 5.97, cottonseed meal 8.77, beef scrap (1:4) 7.87, beef scrap (1:3) 9.51, animal meal 6.13, gluten feed 6.89, and granulated milk 9.7 lbs.

Bone ash and floats were compared as sources of calcium phosphate. The only difference in condition of the bones that could be detected in the experiment was that the legs of the lot fed floats were slightly more crooked than those of the other lot.

No advantage was derived by the addition of sugar to a ration for finishing broilers fed a basal ration of corn meal, wheat bran, beef scrap, and whole milk.

Different concentrates with limestone grit and a constant amount of bone ash were fed to 7 lots, each consisting of 32 White Plymouth Rock chicks 3½ weeks old and fed a basal ration of corn meal, wheat bran, cracked wheat and corn, and bone ash, supplemented with granulated milk, milk albumin (71.1 per cent protein), cottonseed meal, gluten meal, animal meal, or beef scrap. As in previous experiments, the same amount of protein was supplied in the different concentrates, and the amounts of corn meal and wheat bran were so varied as to secure a nutritive ratio of 1:3, except that one lot was given a smaller amount of milk albumin, making the nutritive ratio 1:4. Beets served as green food. During the course of the experiment certain changes and additions in the basal rations widened the nutritive ratio of all the rations about three-fourths of a unit. The weight per 10 chicks at the end of 70 days was as follows: Granulated milk lot 8.87, milk albumin (narrower ratio) 13.38, milk albumin (wider ratio) 13.69, cottonseed meal 8.64, gluten meal 7.26, animal meal 10.07, and beef scrap 10.32 lbs.

To compare beef scrap (in both large and small amounts), cottonseed meal, and gluten meal, 4 lots of 21 Rhode Island Reds 4 weeks old were fed from March 17 to May 19. The basal ration consisted of corn meal, wheat bran, cracked corn, and was so varied that, with the same amount of protein furnished by each concentrate, the nutritive ratio was about 1:3 in each case. Ground bone, grit, charcoal, wood ashes, and rock salt were supplied ad libitum, and a recorded amount of beets was fed daily. The beef scrap (lesser amount) lot weighed 11.81 lbs. per 10 chicks, the lot fed beef scrap (larger amount) 12.52 lbs., that fed cottonseed meal 8.09 lbs., and that fed gluten meal 8.17 lbs.

The bulletin concludes with a digest of data in reference to the concentrates used, in which their comparative merits are judged principally with reference to the rapidity of growth, regardless of the amount of food consumed. Further experiments with cottonseed meal are being made.

Is the Ancona a mottled Leghorn or a distinct breed? F. L. PLATT, R. W. VAN HOESEN and F. L. SEWELL (*Rel. Poultry Jour., 18 (1911), No. 6, pp. 773, 822–824, fig. 1*).—A description of the characteristics and early history of this little-known breed of fowls.

The preservation of eggs, R. BERGER (*Jour. Indus. and Engin. Chem., 3 (1911), No. 7, pp. 493–495; Reprint, pp. 4; Pure Products, 7 (1911), No. 8, pp. 423–425*).—The author tested a number of colloids and crystalloids, some of which were absorbed by the shell and some were not.

All of the absorbed substances gave an alkaline reaction. Caustic soda solution readily penetrated the eggs, causing the albumin to coagulate in a few days, and many eggs when immersed in a 5 per cent solution cracked within the first 24 hours. A solution of 1 volume commercial silicate of soda, 40° Baumé, and 15 or 20 volumes of water, closed the pores of the shell within 3 to 7 days, and limewater was fully as effective in this respect. Sodium alluminate solution, 1:15, required from 2 to 3 weeks, and castile soap, 1:20, about a month. Other solutions which closed the pores were those of bicarbonate, di-, and especially trisodium phosphate. A 3 per cent solution of barium hydrate acted much slower than limewater containing about 0.14 per cent hydrate of lime. The concentration was found of great influence. For instance, with silicate of soda, 1:120, none of the eggs would crack within a period of 15 days.

The author also experimented with eggs in crystallized silicate of soda, or "alkasil," $Na_2O.SiO_2.5H_2O$, and 4 grades of commercial silicate of soda. No great difference was found in the pore-sealing action, but the weights of the eggs increased in the crystallized silicate of soda, the increase ranging from 0.6 per cent in 1 week to 2 per cent in 5 weeks. A similar increase in weight of eggs resulted when the latter were immersed in commercial silicate of soda in which the SiO_2 percentage had been decreased by the addition of caustic soda or lime to such an extent that only 3 molecules or less of SiO_2 were in combination with 2 molecules of Na_2O in the solution. While the weights of many eggs preserved in silicate of soda remained constant within very close limits, there were considerable variations in eggs preserved in limewater and especially in silicate of soda with a low percentage of SiO_2.

To test the permeability of the shells of preserved eggs, a number were kept in the open air for several weeks, and it was found that they would still crack when boiled. After 6 months in the open air their average loss in weight was only 6 per cent, against nearly 20 per cent on unpreserved eggs. Directions for preserving eggs in silicate of soda are given.

DAIRY FARMING—DAIRYING.

Second report of grade dairy herd, A. C. Anderson (*Michigan Sta. Bul. 264, pp. 75–89*).—This bulletin is a report of the milk and butter production, food consumption, and profits for 3 years of the grade dairy herd used in an experiment in herd improvement, and in part has already been reported (E. S. R., 18, p. 172).

The average of 36 records of 21 cows, some of the cows having records for 1, some for 2, and some for 3 years, was 6,228 lbs. of milk and 286.6 lbs. of butter. The average profit per cow over cost of feed was $33.09. The best cow was kept at a profit of $40.57 and the poorest at a profit of only $3.21. The feeding and management of the herd are reported in detail, and comments on a few of the individual cows are included.

First report on the cost of food in the production of milk in the counties of Kent and Surrey, J. Mackintosh (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 35–54*).—A preliminary report on the cost of milk production.

The returns from 59 farms showed that the average cost of feed per gallon of milk was 6.58d. (13.16 cts.), with a range from 3.83 to 10.54d. The cost of feed per cow per day ranged from 7.8 to 24.1d., with an average of 14.88d.

A study of the methods of feeding showed that where large amounts of hay or roots were fed the cost of production was increased.

Progress in selection as shown by advanced register records, M. W. Harper (*Amer. Breeders Mag., 2 (1911), No. 1, pp. 10–19*).—Data from advanced registry of the Jersey and Holstein breeds are presented in tabular form to show that the average and maximum milk production of these breeds as a whole have been raised by discarding the low producers as breeders.

Dairy farm management in the Ozarks, L. A. Allen (*Missouri Bd. Agr. Mo. Bul., 9 (1911), No. 6, pp. 29, figs. 10*).—A study of methods practiced on dairy farms in the Ozarks. Data gathered from other sources are presented, which suggest some important changes in the present system for dairy farming in that region.

Some interesting statistics of creamery work in several important States for the year 1910 (*N. Y. Produce Rev. and Amer. Cream., 32 (1911), No. 12, p. 444*).—This contains data on the amount of butter made, cost of making butter, price paid for butter fat, etc., compiled by the Dairy Division of this Department from reports of creameries in Minnesota, Wisconsin, Iowa, Michigan, and South Dakota.

Cooperative dairies (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 5, pp. 5–30*).—This is a statistical account of the cooperative dairies in Germany. In 1910 there were 3,364, of which 2,155 belonged to the National Federation of German Cooperative Societies. The average quantity of milk each society supplied per day in 1908 was 3,671 kg., an increase of nearly 50 per cent since 1892.

The development of cooperative dairies (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 5, pp. 115–123*).—A general and statistical article pertaining to the rapid growth of cooperative dairying in Russia, particularly in Siberia.

Municipal milk supply in Germany, A. Gradenwitz (*Sci. Amer. Sup., 72 (1911), No. 1854, pp. 40–42, figs. 5*).—A description of the centralized plant for handling the milk supply of the City of Dresden, where the problem of the handling of milk under sanitary conditions has been solved by placing the receiving station for milk under municipal control.

The Copenhagen Milk Supply Company, A. M. Trotter (*Jour. Meat and Milk Hyg., 1 (1911), Nos. 6, pp. 314–322, fig. 1; 7, pp. 359–367, figs. 2*).—This is an account of the origin, methods, and results accomplished by this pioneer institution for obtaining a sanitary and cheaper milk supply.

The precipitation of iron from the dairy water supply (*Molk. Ztg.* [*Hildesheim*], *25* (*1911*), *No. 58, pp. 1095, 1096*).—A method is described for removing iron from water when present in such quantities as to be detrimental to dairy products.

The mammary glands, E. BRESSLAU (*Ergeb. Anat. u. Entwickl.*, *19* (*1909*), *pp. 275–349, figs. 11; abs. in Zool. Zentbl.*, *18* (*1911*), *No. 9–10, pp. 317, 318*).—A bibliography and review of investigations since 1898 on the development of the mammary glands and of their origin in the lower orders of mammals.

On the mode of production of lactose in the mammary gland, D. N. PATON and E. P. CATHCART (*Jour. Physiol.*, *42* (*1911*), *No. 2, pp. 179–188, charts 2*).—The injection of phloridzin into a goat reduced the amount of milk secreted. The amount of lactose in the milk was also reduced, the lowest output being reached either on the day that the largest output of sugar occurred in the urine or just after this. These experiments are taken to indicate that the glucose of the blood is used by the mammary gland in the formation of lactose. The question is still unsolved regarding the source of the galactose.

Some physical and chemical properties of woman's milk, JEANNETTE POLENAAR and H. FILIPPO (*Ztschr. Expt. Path. u. Ther.*, *9* (*1911*), *No. 1, pp. 138–145; abs. in Chem. Zentbl.*, *1911*, *II*, *No. 1, p. 39*).—The results represent a 14-day test with woman's milk, in which the viscosity, electrical conductivity, and freezing point were determined.

Between normal and abnormal cases (such as low yield of milk, albuminuria, or acute or chronic diseases) no difference in viscosity could be noted, as in all instances a regular progressive diminution of the viscosity took place. The electrical conductivity was increased in most instances in the abnormal samples, being greatest in the case of diminished milk secretion, and least in the case of albuminuria. In the normal samples a periodic decrease in the electrical conductivity took place during the first week of lactation.

Contributions to the significance of lime and phosphoric acid in the animal body.—I, Influence upon milk secretion of rations deficient in lime and phosphoric acid, G. FINGERLING (*Landw. Vers. Stat.*, *75* (*1911*), *No. 1–2, pp. 1–52*).—Digestion experiments were made with 2 milch goats which were fed rations composed of hay and sesame cake, which are relatively rich in phosphoric acid and lime, as contrasted with a ration of straw, dried-beet chips, gluten, and peanut oil, feeds which are deficient in the lime-phosphorus compounds. Starch and salt were added to both rations, and in all cases the rations were so balanced that the percentages of protein and carbohydrates were unchanged.

The results substantiate the evidence obtained by other observers, that whenever there is an insufficient supply of lime and phosphoric acid in the ration these compounds are withdrawn from the body, but are restored when a change is made to a ration rich in these compounds or when the deficiency is supplied in the form of dicalcium phosphate. If the deficiency continued for only a few days the flow of milk remained normal, but when continued for any length of time it rapidly decreased. The percentages of phosphoric acid and lime in the milk remain practically unchanged.

The action of animal extracts on milk secretion, E. A. SCHÄFER and K. MACKENZIE (*Proc. Roy. Soc.* [*London*], *Ser. B*, *84* (*1911*), *No. B 568, pp. 16–22, figs. 3*).—The authors studied the effect on the secretion of milk of a large number of animal extracts, including those of the placenta, uterus, fetus, pituitary body, mammary gland, duodenum, liver, spleen, kidney, thyroid, ovary, testis, thymus, and suprarenal capsules. Both cats and dogs were anesthetized either with chloroform alone or with chloroform followed by chloral. The extracts, which in most cases had been boiled, were injected slowly and in small amounts into a superficial vein, and the flow of milk measured both by recording the rate of exudation of milk from a small and superficial cut into one of the mammary glands (exudation method), and by the nipple method, where a canula was tied to a cut nipple. By both methods the milk was allowed to drop upon an electric recorder and the drops marked by an electromagnetic signal upon the paper of a kymograph. In some cases data on blood pressure, volume of the kidney, and rate of excretion of urine were recorded.

The most constant positive results obtained were from extracts of the posterior lobe of the pituitary body of the ox. The effect of the repeat dose on the secretion of the mammary gland was less than that produced by the first dose, and in some cases failed to be recorded by the nipple method, although it could sometimes be observed by the exudation method. The galactagogue substance of the pituitary body was not present in the pars anterior, but only in the pars intermedia and pars posterior of the gland. The galactagogue action ran parallel in time with the action of the extract upon the systemic blood vessels, which were contracted by the posterior lobe extracts. It is probable, however, that, as in the case of the kidney, the blood vessels of the mammary gland do not share in the general constriction which this extract produces. The extract of fresh corpus luteum from the sheep, prepared with Ringer's solution, also yielded a definite positive result, but the effect was less decided than with the extract of the posterior lobe of the pituitary. The active substance is probably different, for its galactagogue action was unaccompanied by the same general rise of blood pressure.

To produce the galactagogue effect it was not necessary to employ a lactating animal, as in one instance a free flow of fluid of serous appearance was obtained from the incised mammary of a cat apparently virgin and not fully grown.

The galactagogue action of secretin, eserin, and nicotin was tested, but with negative results. A dose of pilocarpin induced intense salivation and lacrimation, but had no perceptible influence on milk secretion.

A note is appended to the article stating that since the above paper was read Dr. Mackenzie has found that extracts both of involuting uterine mucous membrane and of the mammary gland itself are markedly galactagogue and that with regard to the action of the pituitary extract the source of this extract appears to make no difference to its activity, the extract of the bird's pituitary being quite as active in promoting the mammary secretion as that of the mammalian pituitary itself. He has also determined that atropin does not interfere with the action of any of these galactagogues.

Mycology of milk, H. WEIGMANN (*Mykologie der Milch. Leipsic, 1911, pp. XVI+267, figs. 94*).—A general treatise on the fermentation of milk and the technique employed in the manufacture of dairy products.

The different sections treat, respectively, of (1) the morphology and biology of micro-organisms in general, (2) descriptions of important groups of bacteria, yeasts, and molds occurring in milk and its products, and (3) an application of the knowledge of these micro-organisms in the production of sanitary milk and in the manufacture of butter and cheese.

The distribution of the "long lactic bacteria"—lactobacilli, W. STEVENSON (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 16-18, pp. 345-348; Jour. Bd. Agr. [London], 18 (1911), No. 4, pp. 307-314*).—The author reports that he found the long forms of lactic-acid bacteria in ordinary market milk in Leipsic, Swiss Emmental cheese, Deutsche cheese, Thüringer Stangerkäse, Cheddar cheese from Scotland, sauerkraut, human saliva, feces of cows, and soil.

A combined milk can and sampler (*Milch. Ztg.*, *40* (*1911*), *No. 24*, *p. 238*, *fig. 1*).—A milk container is illustrated and described, a special feature of which is a perforated tube so constructed that samples of milk can be easily taken without pouring out the contents.

Notices of judgment (*U. S. Dept. Agr.*, *Notices of Judgment 905*, *914*, *979*, *980*, *pp. 2 each*).—These relate to the misbranding of cheese, and the adulteration and misbranding of condensed milk.

Pasteurization of milk in the bottle on a commercial scale, C. E. NORTH (*Med. Rec.* [*N. Y.*], *80* (*1911*), *No. 3*, *pp. 111–115*, *figs. 3*).—In order to discover a method of preventing reinfection after pasteurizing, the author undertook experiments in pasteurizing milk after bottling and sealing with water-tight caps. The pasteurizing was done by both the submerging and shower-bath types of pasteurizers, such as are used in breweries. In all cases a high degree of efficiency was obtained, and the author recommends this method of pasteurizing.

"The pasteurization of milk in the bottle on a large scale is entirely possible and practicable. The placing of milk in a glass bottle with a water-tight seal, followed by pasteurization of the entire package, guarantees against reinfection until the bottle is opened and will place the operation of pasteurization as such above criticism. The adoption of this method by the large milk dealer will, I am sure, be a great step in advance and not only give additional protection for the product, but will also give a guarantee to the milk consumer against milk-borne infections which has not existed up to this time."

"It is not customary in the brewing industry to cool bottled beer to the same degree that milk is cooled; consequently, pasteurizers of beer are not equipped for cooling to low temperatures. It is, however, only a matter of adjustment to make provision for such cooling as is required in the milk industry. The capacity of the large pasteurizers used for bottled beer is in every respect equal to the needs of the large milk dealer."

Cream raising with pasteurized milk, M. KERSTEN (*Molk. Ztg.* [*Hildesheim*], *25* (*1911*), *Nos. 30*, *pp. 553–555*; *31*, *pp. 567–569*).—Pasteurizing milk for a short time at a low temperature (60° C.) caused the cream to rise more rapidly than in the case of raw milk. When the milk was held for some time at that temperature, or when heated to a temperature of 65° or over, the cream rose more slowly than in the unpasteurized milk. Pasteurizing at a temperature of 63° for a few minutes gave about the same results as when unheated.

The isolation of Bacillus typhosus from butter, D. H. BERGEY (*Jour. Med. Research*, *25* (*1911*), *No. 1*, *pp. 231–233*).—The author was able to pick out the colonies of *B. typhosus* from among the colonies of other bacteria in butter when grown on the Drigalski-Conradi agar and malachite green agar.

The control of pathogenic organisms in butter, J. N. FORCE (*Cal. State Jour. Med.*, *9* (*1911*), *No. 9*, *pp. 367–370*, *fig. 1*).—A study of the vitality of pathogenic organisms in butter showed that the bacterial count of butter does not serve as a measure of the contamination of the product for the reason that bacteria decrease as the butter grows older. Standard agar plates showing a preponderance of molds over bacteria are a slight measure of the age of butter and lack of cleanliness of utensils.

A method is outlined for the municipal control for the production of market butter. Score cards are proposed for scoring market butter and butter-making establishments.

Regulations governing the manufacture of certified butter (*Cal. State Jour. Med.*, *9* (*1911*), *No. 9*, *p. 389*).—These regulations were adopted by the California Association of Medical Milk Commissions in 1911.

Condensed milk in the Orient, L. M. Wood (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 202, pp. 929–932*).—This report contains statistics on the increase of exports of condensed milk from the United States to China and Japan.

Investigations on the ripening of cheese, especially the defect known as "short" cheese, F. W. J. Boekhout and J. J. Ott De Vries (*Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat.* [*Netherlands*], *1911, No. 9, pp. 5–25; Molk. Ztg. Berlin, 21* (*1911*), *Nos. 21, pp. 241, 242; 22, pp. 253, 254*).—The data in this article have been previously noted (E. S. R., 21, p. 679).

A new revolving cheese-press table, M. Reinisch (*Österr. Molk. Ztg.*, *18* (*1911*), *No. 10, p. 151, figs. 3*).—A cheese press is illustrated and described, the principal feature of which consists of a contrivance for turning the cheese.

VETERINARY MEDICINE.

A practical guide to the newer remedies, J. M. Fortescue-Brickdale (*New York, 1910, pp. VIII+273*).—This is a review of the newer drugs, the composition of which has been published elsewhere, and a discussion in regard to their pharmacology. The drugs are mainly synthetic products.

Immunization with vegetable proteins, Wendelstadt and T. Fellmer (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 8* (*1910*), *No. 1, pp. 43–57; abs. in Chem. Abs., 5* (*1911*), *No. 3, p. 530*).—The tests were made with ordinary saline extracts of unknown composition obtained from peas, beans, cereals, and the foliage of the same plants.

Immunization of the rabbit against the poison of amanites, Radais and Sartory (*Compt. Rend. Acad. Sci.* [*Paris*], *151* (*1910*), *No. 2, pp. 156–158, fig. 1; abs. in Chem. Abs., 4* (*1910*), *No. 23, pp. 3255, 3256*).—The juice obtained from the caps of a large quantity of poisonous mushrooms (*Amanita phalloides* and *A. mappa*), which were preserved with mustard essence, was injected into rabbits with the result that the minimum lethal dose was found to be 8 cc. The symptoms preceding death were gastrointestinal in nature and paralysis. Death occurred in about 24 hours. The continued injection of minimum doses of *A. mappa* produced an immunity, with the optimum point at 4 months, which enabled the animal to withstand many times the minimum fatal dose.

Analysis of Zygadenus intermedius ("death camas"), F. W. Heyl and L. C. Raiford (*Jour. Amer. Chem. Soc., 33* (*1911*), *No. 2, pp. 206–211; abs. in Analyst, 36* (*1911*), *No. 421, p. 156*).—As several species of Zygadenus are causing heavy stock losses in Wyoming, Montana, and other northwestern States, the authors made a proximate and toxicological analysis of the leaf, flower, bulb, and root of *Z. intermedius*. By using a modified U. S. Pharmacopœia method for assaying belladonna, the authors were able to isolate the following amounts of crystallizable alcoholic residues: Leaf 0.41 per cent, 0.28 per cent, and 0.26 per cent, and in the bulb, 0.39 and 0.24 per cent. The dried plant when ground gave off dust which was very irritating, and which the authors believe to be veratralbine.[a]

Qualitative and quantitative determination of castor-oil seeds in wheat feed meal, H. Miessner (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 3* (*1911*), *No. 4, pp. 269–273*).—Wheat meal which was fed to 2 horses caused the death of the animals within 3 days. The author suspected the presence of castor-oil seeds in the feed and conducted precipitation and conglutination tests for the presence of ricinus. The results were positive. The author details the methods used for their detection. The results of a feeding test with a horse and calf are also given.

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[a] Amer. Jour. Pharm., 77 (1905), p. 262.

Report in regard to the activities of the health department of the chamber of agriculture in the Province of Pomerania, 1909–10, SCHMITT (*Abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 49* (*1911*), *No. 5, p. 129*).—In the work in regard to bovine tuberculosis 300 barns containing 26,155 animals over 6 months old were examined for clinical and open tuberculosis. For the bacteriological tests 512 samples of milk, 36 samples of nasal secretion, 13 samples of vaginal and uterine secretions, 1 piece of mucus tissue from the vagina, 2 pieces of lymph gland from the udder, and 2 samples of feces were received.

Open tuberculosis was detected in 36 bovines by clinical measures and in 78 by bacteriological tests. It was distributed as follows: Out of 925 bulls (breeding) none were affected; of 16,183 cows 110, or 0.68 per cent; of 8,897 young bovines 3, or 0.03 per cent; and of 150 draying cattle and cattle reserved for fattening 1, or 0.67 per cent. Of these 114 diseased animals 56 had tuberculosis of the mammary gland, 56 tuberculosis of the lung, and 2 tuberculosis of the uterus or vagina.

For combating hemoglobinuria of bovines, the vaccine prepared at this institution was utilized, and among 4,456 animals the protective vaccination reduced the mortality and the disease to a very large extent.

In regard to the disinfection of goats' hides and hair, H. A. GINS (*Desinfektion, 3* (*1910*), *No. 8, pp. 405–407; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 48* (*1911*), *No. 18, p. 567*).—It was possible to destroy anthrax spores in hides and hair with a formaldehyde steam mixture at 60° C. under a diminished pressure (160 mm. of mercury) in Rubner's apparatus. The hides, however, were also destroyed by the process, although the bristles were not.

Sero-diagnosis of glanders, F. K. MEYER (*Amer. Vet. Rev., 39* (*1911*), *Nos. 2, pp. 176–188, figs. 2; 3, pp. 261–269*).—This is a discussion of the agglutination test, deviation of complement test, precipitation test, and sero-anaphylactic test, with particular reference to the value and technique of the complement-binding or deviation test for glanders in animals (E. S. R., 25, p. 181).

Interpreting the mallein reaction, W. N. MATWEJEFF (*Abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3* (*1910*), *No. 9, p. 889*).—In a paper read before the Second Veterinary Congress at Moscow, 1910, the author, after discussing the numerous practical rules for conducting this test, points out the necessity of taking the temperature at least 4 hours before introducing the mallein, and then determining the temperature hourly, beginning at the seventh hour after the injection and continuing it the 7 succeeding hours.

The mallein is best introduced in the forebreast because of the fact that this region is a favorable anatomical one for observing the swelling which takes place. The characteristics of the typical swelling, which has a definite line of demarcation, are a very pronounced, hard, painful area which is very warm to the touch. The size is usually 15 by 15 cm. In normal horses a local swelling also takes place when mallein is injected, but it is not so large as that in the glandered animals.

The author points out that the focal reaction, in the sense of an exacerbation must not be overlooked, in interpreting the mallein reaction. If a doubtful result is obtained, the author recommends a second injection of mallein, but only after one month has elapsed.

Hog cholera in man, F. ERBEN (*München. Med. Wchnschr., 58* (*1911*), *No. 6, p. 299*).—The author reports the symptoms of a condition which was produced in 5 individuals (2 adults and 3 children) by the ingestion of the viscera obtained from 2 hogs suffering from hog cholera.

Endemic Mediterranean fever (Malta fever) in southwest Texas, T. L. Ferenbaugh (*Jour. Amer. Med. Assoc., 57 (1911), No. 9, pp. 730, 731*).—It is stated that during recent years there have been a few cases of continued fever of long duration, frequent relapses, and a low mortality, in the Pecos River country of Texas. While stationed at Del Rio with the United States Army 5 cases of this affection came to the author's attention. Agglutination tests made with *Micrococcus melitensis* were positive, while tests with *Bacillus typhosus* were negative. All 5 of the patients had worked in goat camps and 4 had drank goat's milk.

The author considers it possible that the goats of the Pecos River country, and doubtless along other sections of the border, are infected with the *M. melitensis*. The drinking of goat's milk in the Pecos River country is not common, except among Mexicans and those located at isolated goat camps, but the author was informed that along some sections of the border as much goat's milk is drunk as cow's milk, this being especially true for the Mexican population.

Studies in regard to the etiology of rabies, J. Koch (*Ztschr. Hyg. u. Infektionskrank., 66 (1910), No. 3, pp. 443–453, pl. 1*).—The author has continued the work previously noted (E. S. R., 24, p. 83), with the aid of Krogh's new staining method.

With this he was able to verify his former conclusions, that the extra and intracellular cocci-like bodies observed in the gray substances of the brain and cord in rabies were not artifacts or products of degeneration, but definite forms which may have a relation to parasites. In some of the experimental quiet cases Negri bodies could not be observed. From this he concludes that some difference must exist between the disease produced artificially and that conveyed by the bite of the dog. He points out the various areas in which these formations are most likely to be found and the method for detecting them. He holds that the inner cocci-like formations of the ganglion cells and gray substance are identical with the inner formations of the Negri bodies, which are considered spores by Negri.

A new harmless, easy, and simple method for conducting the tuberculin reaction, P. Barabaschi (*Gaz. Osped. e Clin. [Milan], 31 (1910), No. 94, pp. 987–989; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 12, p. 1053*).—The method consists of strongly rubbing the area with absolute alcohol to produce a hyperemia and redness of the skin. In the center of this zone a thin layer of crude tuberculin is applied and then allowed to dry. The reaction when positive manifests itself by forming red, slightly raised blisters, which appear in from 24 to 72 hours.

The antiformin method for examining sputum, Sachs-Müke (*Deut. Med. Wchnschr., 36 (1910), No. 7, pp. 320, 321; abs. in Hyg. Rundschau, 20 (1910), No. 21, p. 1171*).—This is a comparative test between the antiformin and hydrogen peroxid methods for detecting tubercle bacilli. The results show that the first-named failed to detect the bacilli in two instances, while the latter showed their presence. The author believes that antiformin destroys the tubercle bacilli, and recommends the adoption of the hydrogen peroxid method.

Experimental investigations in regard to the virulence of old (inactive) tuberculous foci in bovines, B. Uhlenbrock (*Experimentelle Untersuchungen über die Virulenz alter (inaktiver) tuberkulöser Herde beim Rind. Inaug. Diss., Univ. Bern, 1910, pp. 31; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 5 (1911), No. 5, p. 234*).—In old calcified foci tubercle bacilli could be noted. The bacilli, however, had undergone a certain amount of degeneration and showed a diminished virulence.

The elimination of tubercle bacilli from infected cattle, and the control of bovine tuberculosis and infected milk, V. A. Moore (*New York Cornell Sta. Bul. 299, pp. 697-714*).—This bulletin first describes the channels through which tubercle bacilli get into the milk of infected cows and the frequency with which market milk is found to contain them.

Numerous examinations were made in order to gain definite knowledge of the frequency with which this bacillus occurs in the milk and feces of cows that react to tuberculin. In preliminary work a total of 136 samples of milk and 36 of feces were examined. Of the milk samples, 49 were mixed and 87 were from individual cows, 2 with diseased udders. In all, 80 guinea pigs were inoculated, each receiving 2 cc. of the sediment from the centrifuged tube. Sixteen of the pigs were injected in the abdominal cavity, while the others received the sediment subcutaneously. The results of these examinations were as follows:

"Of the 49 examinations of mixed milk, tubercle bacilli were found in one specimen microscopically and no inoculations were made. Later experience suggests that possibly these were acid-fast organisms other than true tubercle bacilli. It was not known to us whether or not clinical cases existed in this herd. Guinea pigs inoculated with the mixed milk from 2 herds developed tuberculosis. In these herds it was known that there were clinical cases. After these were removed subsequent inoculations gave negative results. The guinea pigs inoculated with the samples from the other mixed milk either died within a few days from sepsis, or remained well. Thus there were 2 of the 49 samples that contained infecting organisms and possibly the third did also. This gives as the maximum a little over 6 per cent that contained tubercle bacteria.

"Of the 87 examinations of the milk from individual cows, tubercle bacteria were not found either microscopically or by guinea pig inoculations except in 2 cases, and these were samples of milk from the cows whose udders were affected. They were the only cows that showed any clinical evidence of disease, and at the time the lesions in the udders were not thought to be of a tuberculous nature. Tubercle bacilli were present in very large numbers in the milk from each of these cows. The bacilli were largely outside of the tissue cells, lying free between the leucocytes and fat globules of the milk. In 2 specimens acid-fast or timothy bacilli were present in very small numbers. They were decolorized with acidulated alcohol. Guinea pigs inoculated from these samples did not develop tuberculosis. If we exclude the 2 cases in which there was udder affection, tubercle bacteria were not found in any of the samples. If they are included, a little over 2 per cent of the examinations were positive.

"The 36 examinations of the feces failed to reveal the presence of tubercle bacteria, either microscopically or by animal inoculation. One specimen contained a few acid-fast organisms. The guinea pig inoculated from this specimen did not develop tuberculosis."

The results obtained from repeated examinations of milk and excreta of reacting cows, and from feeding the milk of such cows to young pigs during the time the milk and feces were being examined microscopically and guinea pigs were being inoculated, lead the author to conclude that "the spread of tubercle bacilli is not generally taking place, at least to any detectable degree, from occult cases of bovine tuberculosis. The evidence thus far gathered is quite as conclusive that cows with udder tuberculosis are eliminating tubercle bacilli in large numbers with their milk, and that advanced cases of pulmonary tuberculosis, or perhaps earlier ones in which the lesions are discharging into the bronchi, and cases of intestinal lesions are eliminating them with the droolings from the mouth and with the feces.

"The presence of tubercle bacilli in milk seems to be accounted for by tuberculous udders and from contamination of the milk with the feces. When these facts are applied to the milk situation it seems fair to assume that if the cows in the dairies producing milk for the market were carefully and frequently examined for evidence of the disease and all those found to be thus affected were excluded the number of samples of market milk containing tubercle bacilli would be greatly reduced if they did not entirely disappear."

The author states that a careful and often repeated physical examination of infected herds and the removal of all suspicious cases will check to a large extent the spread of the disease to other animals in the herd and will minimize the number of bacilli in the milk, thereby protecting the consumer. However, to prevent the interherd spread of the disease tuberculin must be properly applied to all cattle coming into sound herds.

The International Commission's recommendation on eradication, a full report of which has been previously noted (E. S. R., 25, p. 384), is appended to the bulletin.

The elimination of tubercle bacilli from infected cattle, V. A. MOORE (*Jour. Med. Research, 24 (1911), No. 3, pp. 517–525*).—Noted above.

The treatment of contagious granular vaginitis in cattle, A. LASZLÓ (*Vet. Jour., 67 (1911), No. 434, pp. 484, 485*).—The author has obtained successful results from the use of "Bissulin," a mercury preparation.

Experimental prophylaxis for distomiasis, A. RAILLIET, G. MOUSSU, and A. HENRY (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 11, pp. 425–427*).—In tests made of the resistance of the ciliated larvæ of the liver fluke to various chemicals used as fertilizers, etc., including gypsum, lime, iron sulphate, and the nitrates, sulphates and chlorids of potassium and sodium, it was found that the larvæ were manifestly more susceptible to the action of sodium salts than to those of potassium. Agricultural lime, however, was found to be the most destructive agent tested, immediate destruction following the use of 3 gm. of lime to a liter of water, or, 0.75 parts in 1,000. In order to be effective liming should be done in the spring or in summer.

In experimenting with small undetermined species of snails, it was found that they were destroyed when exposed for 5 minutes to a solution of 0.5 parts of lime in 1,000.

Experimental treatment of distomiasis, A. RAILLIET, G. MOUSSU, and A. HENRY (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 11, pp. 427–429*).—In the attempt to destroy the liver fluke while in the liver, the authors used aloes, calomel, sodium salicylate, and boldo. The greater number of the animals affected were benefited by the treatment, but the parasites were not destroyed, as was determined at post-mortem examination. Other experiments in which phosphorated oil, arsenic, atoxyl, dioxydiamidoarsenobenzol, trypanblue, benzoate of mercury, and fluid extract of genista (scoparius) were employed, were without positive results.

Researches on the treatment of distomiasis of the sheep, A. RAILLIET, G. MOUSSU, and A. HENRY (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 17, pp. 1125–1127; Rec. Méd. Vét., 88 (1911), No. 9, pp. 283–289; Vet. Rec., 24 (1911), No. 1200, pp. 17–19*).—Severe losses of cattle in France during the early months of 1911 led to the investigations of the liver flukes here reported.

In attempting to find an agent that will destroy the flukes in the bile ducts, the authors experimented with aloes, calomel, sodium salicylate, "boldo," tartar-emetic, urotropine, and atoxyl, with negative results. They were more successful in experiments with ethereal extract of male shield fern.

It was found that the large fluke, *Fasciola hepatica*, and the small fluke, *Dicrocaelium lanceatum* seu *dendriticum*, manifested a very different resistance to the action of drugs. The experiments indicate that the ethereal extract of male shield fern acts only on the large flukes and exclusively on those of the liver, the flukes which have migrated to the peritoneal cavity not being affected. Four doses of 5 gm. each appear to be required in order to assure the success of the treatment.

Protective vaccination against swine plague, Buss (*Mitt. Ver. Bad. Tierärzte, 10 (1910), No. 5, pp. 76, 77; abs. in Centbl. Bakt.* [etc.], *1. Abt., Ref., 49 (1911), No. 5, pp. 154, 155*).—The author points out that the bivalent serum of Klett-Braun is a good one, but that on account of its price its use is not always possible.

Researches in regard to "esponja," a disease which affects solipeds in certain parts of Brazil, P. Ferret, A. Dupuy, and L. Mercier (*Compt. Rend. Soc. Biol.* [*Paris*], *69 (1910), No. 38, pp. 654–656, pls. 2; abs. in Centbl. Bakt.* [etc.], *1 Abt., Ref., 49 (1911), No. 5, p. 135*).—Among horses in Brazil a disease was noted which was characterized by the formation of nodules in the skin which went over to pus formation. The nodules were found to contain a nematode, which is described, and some yeast-like bodies. The authors were in doubt as to which of the two was the causative agent.

[Report of] veterinary department, L. Van Es (*North Dakota Sta. Rpt. 1909, pp. 97, 98*).—The author states that studies of infectious anemia of the horse conducted during the year show conclusively that an infected horse may die of the disease without any reduction of the red blood corpuscles, that certain cases may run along for considerable periods without an elevation of the body temperature, that such horses, although they fail to present any clinical evidence of the disease, still carry the infectious agent, and that when small quantities of their blood are injected into normal horses the disease is promptly reproduced.

[Report of] veterinary department, L. Van Es (*North Dakota Sta. Rpt. 1910, pp. 55–57*).—A brief summary is presented of investigations of swamp fever conducted during the year ended February 28, 1911, the detailed results of which were awaiting publication.

A study showing bacteria and animal organisms determined in the feces and intestinal mucosa of healthy chickens, G. E. Gage (*Maryland Sta. Bul. 153, pp. 201–226*).—Three observations were made upon the feces of each of 45 birds ranging in age from 1 day old up to 2 years. Observations were also made upon the intestinal mucosa of 60 birds, including birds taken from the shell, newly hatched chicks, and fowl ranging in age up to 2 years.

It was found that the intestinal flora of healthy domestic fowls vary to some extent with the conditions of poultry environment and different stages of life.

"It may be stated that approximately 60 per cent of the organisms in the domestic fowl do not stain by Gram's method, and that under ordinary conditions of poultry environment approximately 40 per cent are gram-negative in their staining reactions. The *Bacillus coli* type of organisms represent the larger part of the gram-negative percentage.

"The intestinal mucosa of the healthy domestic fowl may harbor a large and varied flora which is constant only to a certain extent. Few obligatory anaerobes are present.

"*B. coli* was the preponderating organism in the intestinal mucosa and the feces, and undoubtedly it plays the same rôle physiologically that it does in the alimentary canal of higher animals. Since it is so omnipresent it is undoubtedly an obligate bacteria, and under some circumstances renders service by producing conditions which discourage the growth of many harmless and harmful species which the bird can not exclude readily.

"The absence of large numbers of obligatory anaerobes of the *B. putrificus* type would indicate that the intestinal conditions in the healthy domestic fowl are not inducive for anaerobiosis.

"Chickens reared under sanitary conditions do not harbor many animal organisms. In several subjects in the best of health Euglena and *Paramecium caudatum* were found by examinations of fresh preparations. Heterakis worms and tapeworms are found in healthy birds, but their presence must be looked upon as indicative of some unsanitary condition in the poultry yards. They may cause intestinal lesions, which may later be the starting point of more serious infections. Tapeworms in small numbers, according to observations made after death, do not appear to cause serious pathological effects.

"The presence of *Cladothrix asteroides* in the intestinal mucosa has not in any instance appeared to be pathogenic for the domestic fowl in any stages of its life."

Is it tuberculosis?—An important question, G. B. MORSE (*Rel. Poultry Jour., 18 (1911), No. 6, pp. 778, 828, 829*).—As a result of examining the caseous matter present within the lids of a roupy black Minorca fowl it was found to contain numerous acid-fast bacilli, which, however, were not alcohol acid-fast and were not morphologically characteristic of the bacilli usually found in tuberculosis of fowls. They were short, generally slightly curved, pointed at both ends, and rarely beaded.

A bacillus of the same kind was found in nodules on the wing, beneath the eyes, etc., of pigeons (pigeon disease). Some of the material was inoculated into a pocket made beneath the conjunctiva of the right eye of a pullet and into the right eye of a young pigeon, and with another pigeon into a subcutaneous pocket in the right side of the neck. In about 5 days a lump was produced in each case, from which the characteristic bacilli were isolated.

According to the author, "it therefore appears that this quite common disease of pigeons, usually pronounced tuberculosis on account of finding acid-fast bacilli in the cheesy material, must be recognized as a pseudo-tuberculosis."

Tests with Wech's vaccine (gallin) against fowl diphtheria, ZEH (*Landw. Wchnschr. Sachsen, 12 (1910), No. 6, p. 44; abs. in Berlin. Tierarztl. Wchnschr., 27 (1911), No. 12, p. 210*).—This preparation did not yield good results.

RURAL ECONOMICS.

A study of farm equipment in Ohio, L. W. ELLIS (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 212, pp. 57, figs. 4*).—This bulletin presents the results of a study of farm equipment, under the joint auspices of the Office of Farm Management of this Department and the department of cooperation of the Ohio Agricultural Experiment Station, on a number of Ohio farms where conditions were unusually favorable for obtaining information as to the proper relationship between investments in land, improvements, live stock, machinery, tools, and other farm equipment. Considerable data and a number of tables are presented illustrating the distribution of investments and showing the approximate cost and value of many items which serve to illustrate by concrete examples many of the factors to be taken into consideration in equipping farms. Other tables show the average area and the volume of space devoted to live-stock enterprises, and the storage of products, machinery, etc., in buildings, and the cost, value, and number of rods of fencing per acre on each of 21 successful farms.

As to the distribution of acreage by enterprises it is shown for the group of 21 farms, with an average size of 165.88 acres, that each has an average of

5.51 acres included in lots, lanes, waste spots, public roads, and other lands belonging to the farm which can not be properly charged to any other enterprise or group of enterprises; 2.04 acres in dooryard, family garden, and orchard, when not grown as a commercial proposition; 0.08 acre in tenant yards, gardens, etc.; 46.5 acres in lots, pastures, and fields devoted exclusively to live stock; 85.71 acres in tilled and mowed fields; 2.98 acres in permanent groves maintained largely for the production of maple sugar or sirup; 1.95 acres in fruit orchards largely commercial in their nature; and 21.11 acres in woodland. The mean average in crops is shown to be 52.8 per cent.

The first cost of equipping an average farm in Ohio is approximated as follows: Land, 165.88 acres at $46.25 (average) per acre, $7,676.42; farm buildings, $2,700; household buildings, $2,500; fences, $763.74; drainage, $366.43; water supply, $225; work animals, $640.71; colts and driving horses, $250.95; cattle, $582.26; sheep, $201.05; swine, $158.34; poultry, $52.60; bees, $3.23; harness, $131.05; machinery, $1,125.48; minor articles, $200; produce, supplies, etc., $631.93; total, $18,209.19. Of course, this applies only to farms equipped outright with new buildings, fences, machinery, etc.

The average cost per acre per year of machinery, which is represented by the sum of depreciation, repairs, and interest, is shown to be as follows: Walking plow, $0.072; riding (or gang) plow, $0.183; spike harrow, $0.019; spring harrow, $0.027; disk harrow, $0.049; roller, $0.02; planker or drag, $0.008; weeder, $0.033; corn planter, $0.081; 1-horse cultivator, $0.043; 2 or 3 horse cultivator, $0.041; corn binder, $0.369; corn shocker, $0.842; grain binder, $0.264; grain drill, $0.13; hay loader, $0.248; mowing machine, $0.105; hayrake, $0.055; and tedder, $0.164.

A study of farm equipment, L. W. Ellis (*Ohio Sta. Bul. 227, pp. 203–253, figs. 4*).—Noted above.

Farm machinery (*Wyo. Farm Bul., 1 (1911), No. 2, p. 31*).—The economic significance of important farm machinery generally is discussed, and the belief expressed that it is not only cheaper than manual labor, but will do the work better in most cases. A loan system inaugurated at the Wyoming Experiment Station is described, by which manufacturers loan farm machinery of various kinds to the station for use in public inspection, demonstrations, and experimental work on the station lands.

Cost of growing crops in Nebraska, C. W. Pugsley (*Nebraska Sta. Bul. 122, pp. 3–12*).—The data reported in this bulletin were secured by correspondence with a large number of farmers in various parts of the State and are given as an indication of the cost of production of the most common farm crops on an average Nebraska general-purpose farm.

The following table summarizes data as to the average cost of growing corn, wheat, oats, wild hay, clover, and alfalfa, including interest and taxes and the time for men and teams while in the field, but not including marketing:

Average cost of growing various field crops in Nebraska.

Kinds of crop.	Yield per acre.	Cost per acre.	Cost per bushel or per ton.
Corn .... bushels.	39.30	$11.63	$0.296
Wheat .... do...	22.20	12.19	.549
Oats .... do....	35.00	11.39	.325
Wild hay .... tons..	1.25	6.72	5.370
Clover .... do....	2.04	8.54	4.180
Alfalfa .... do....	3.33	10.33	3.100

It was found that the two greatest factors in influencing the cost per bushel or ton were the price of land and the yield per acre. At the average market prices the most profitable crops considered were wheat, corn, and alfalfa.

The average cost of growing crops in Nebraska, C. W. PUGSLEY (*Independent Farmer, 44* (*1911*), *No. 50, pp. 787, 788*).—A popular summary of the above.

A successful New York farm, M. C. BURRITT (*U. S. Dept. Agr., Farmers' Bul. 454, pp. 32, figs. 9*).—This is the story of the struggles and successes on 57 acres of land of a plain New York farmer, who began with the common drawbacks, such as indebtedness, lack of capital, run-down land, poor drainage, etc., but who, by applying systematic methods to the farm and by thorough organization of the business, converted it into an example of profitable farming. The method of organization of the farm, preparation of the land, fertilization, seeding, planting, cultivation, harvesting, marketing, and general results are fully set forth and illustrated. The pursuance of a well-developed systematic plan is considered the secret to his success.

Notes from the agricultural survey in Tompkins County, G. F. WARREN and K. C. LIVERMORE (*New York Cornell Sta. Bul. 302, pp. 767–772*).—A condensation of Bulletin 295 previously noted (E. S. R., 25, p. 594).

Agriculture in the central part of the semiarid portion of the Great Plains, J. A. WARREN (*U. S. Dept. Agr., Bur. Plant. Indus. Bul. 215, pp. 43, figs. 4*).—This bulletin presents a study and discussion of the management of "dry farms" and the problems confronting the farmers of the semiarid portion of the Great Plains, changes in the economic conditions, the climate, precipitation, evaporation, effect of wind on agriculture, soils, farm practices in the region, improved methods of tillage, and the introduction and development of drought-resistant crops.

It is pointed out that on the better lands near the eastern limit of the territory 320 acres should be sufficient to support a family, but that near the western limit from 2 to 4 sections would be needed. It is not considered a place where one should expect to make large profits on small farm investments. "No man should go empty handed into this country, but many men with limited means who are willing to endure some privations will be able to secure a foothold and establish homes." It is suggested that from $6,000 to $8,000 should buy enough land to support a family of average size, and that where it is simply a stock proposition $50 should buy enough land to pasture 1 cow.

Suggestions to settlers on the Belle Fourche irrigation project, B. AUNE (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 83, pp. 14*).—This circular presents suggestions to settlers on the Belle Fourche irrigation project, giving a description of the region, and notes on the treatment of sod land, preparation of the seed bed, adaptability of various crops and fruits to the soil, methods of culture, tree planting for windbreaks, methods of irrigation, publications of value, etc.

Large and small holdings, H. LEVY (*Cambridge, 1911, pp. VIII+249*).—This is an English edition of a work previously noted (E. S. R., 16, p. 108), to which have been added a discussion as to the modern small farmer and the question of home colonization, tables showing the area of agricultural land under the various types of holdings throughout the English counties, and a lengthy bibliography.

Agricultural cooperation, S. E. TODD (*Ontario Dept. Agr. Bul. 192, 1911, pp. 52*).—This bulletin presents a discussion as to the historical development and fundamental principles of agricultural cooperation, and illustrates by concrete examples its practical application in dairying, fruit-marketing, and similar societies in Canada, the United States, and foreign countries. A set of by-laws recommended for adoption in the formation of such societies is appended, together with a list of cooperative fruit growers' associations in Ontario in 1911.

Rural Denmark and its lessons, H. R. HAGGARD (*London and New York, 1911, pp. XI+335, pls. 16*).—This book presents data gathered by the author while inspecting Danish farms of various sizes. In addition to many other phases of rural life discussed and illustrated it treats of the following subjects: Credit union banks; the state small holdings; the economic position of Danish agriculture; cooperation in Denmark; societies for purchase and sale; and the State and its relation to agriculture in Denmark.

Cooperative agriculture in northern Holland, D. P. DE YOUNG (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 206, pp. 1010, 1011*).—The report shows that one of the most important features of the agricultural industry in northern Holland is the tendency toward cooperation. Instead of being either national or provincial in character, as the associations were 10 years ago, and dealing with theoretical problems and ignoring the more vital matters of practical farm life, they are administering more to local needs, such as cooperative buying, credit, insurance, education, and general social uplift, gradually approaching a state of mutual cooperation. In connection with the general organizations there are numerous societies for special purposes, such as dairying, fertilizers, cattle breeding, farm administration, household economics, and a great diversity of other problems.

The report shows that the membership of the provincial farmers' associations numbers 56,000, agricultural societies 31,500, stock growers' organizations 2,400, and various rural cooperative societies 38,000. The value of the goods purchased by these societies in 1907 was $7,477,200, as compared with $4,776,162 in 1904. In the last decade the increase in agricultural products in this section has been about 75 per cent, attributed largely to the system of cooperation.

The banker and the farmer (*Wallaces' Farmer, 36* (*1911*), *No. 24, p. 938*).—This article calls attention to the increased interest in farming manifested by bankers, showing that the bankers of the central West have interested themselves in promoting corn contests, short courses, institutes, and other activities which tend to raise the grade of farming. As an illustration is cited the recent proposition by the Jersey State Bank, Jersey, Ill., which proposes to loan any farmer as much as $3,000 on approved notes without interest until after the harvest of 1912 for the purchase of commercial fertilizers or ground limestone to be used on wheat ground this fall.

[Rural economics—discussions] (*N. Y. Dept. Agr. Bul. 23, pp. 261–473*).—This bulletin gives the proceedings of the seventy-first annual meeting of the New York State Agricultural Society. Among the papers are the following: Feeding Our People of the Future, by N. P. Hull; The Development of Our Agricultural Resources and the Relation Between this Problem and the Cost of Living, by R. A. Pearson; Relation of Railroad Rates to the Prices of Farm Products, by Ira Shoemaker; and Farmers' and Consumers' Prices of Farm Products, by George K. Holmes. A report of the committee on the marketing and transportation of agricultural products and a general discussion of this topic are also included.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 13* (*1911*), *Nos. 7, pp. 49–56; 8, pp. 57–64, figs. 2; 9, pp. 65–72, figs. 2*).—Notes and statistics are given on the condition of crops in the United States and foreign countries, a comparison of conditions at corresponding periods for a number of years, farm values and range of prices of agricultural products in the United States, monthly receipts and stocks of eggs and poultry in the United States, monthly movement of grain from the farms, temperature and precipitation statistics, and other data.

Foreign crops, July, 1911, C. M. DAUGHERTY (*U. S. Dept. Agr., Bur. Statis. Circ. 21, pp. 15*).—This circular reports the acreage and condition of the principal crops in foreign countries in July, 1911, the prospective yields compared with actual yields last year, and the imports and exports of wheat and wheat flour in several foreign countries.

Tobacco report, July 1, 1911, J. P. KILLEBREW (*U. S. Dept. Agr., Bur. Statis. Circ. 22, pp. 8*).—This circular reports the acreage and condition of tobacco in the United States July 1, 1911, by States and districts, with comparisons with previous years. The area of cigar-leaf tobacco is shown to be 154,200 acres against 146,200 acres last year, an increase of 5.6 per cent, while in the chewing, smoking, snuff, and export districts the area is 730,600 acres compared with 1,070,100 acres last year, a decrease of 31.7 per cent.

AGRICULTURAL EDUCATION.

A study of 15 consolidated rural schools; their organization, cost, efficiency, and affiliated interests, G. W. KNORR (*Washington, 1911, pp. 55, figs. 18*).—This is a report covering a study tour by southern state superintendents of schools in communities having successful consolidated rural schools, with a view to learning at first hand the financial, agricultural, and social conditions under which consolidation of schools was effected in the respective localities, the degree of development of this new form of rural schools, how far the schools meet the needs of the rural communities which they serve, and to what extent the schools, once permanently established, enter the rural community life, become part of it, and prepare its youth vocationally for life's work. The 15 schools included in the itinerary are located in Montgomery and Tippecanoe counties, Indiana, Trumbull county, Ohio, and one in Maryland. The total enrollment was 2,381 pupils, of which 501 were in the high school, representing a total rural population of approximately 14,300.

It is reported that these communities have demonstrated to their own satisfaction that consolidated schools more fully meet their needs than the small district schools which were displaced. The schools have now so completely become a part of the respective communities "that none would for an instant entertain the proposition to abandon them and return to the small detached schools of former days."

The statistical data included in the publication afford information as to (1) the location of buildings, their cost, and average distance from homes; (2) the annual total expenditures for the maintenance of the schools, for the conveyance of pupils, and the cost of schooling per pupil per day; (3) the number and kind of teachers, and the number of district schools merged; (4) the organization of the school wagon service, the size of districts maintaining such service, and the enrollment and average attendance of pupils.

A review of the observations made by the visiting superintendents brought out the theory "that consolidation seldom proceeds successfully without the approval and general support of the community concerned."

The teaching of agriculture in the secondary schools, L. ANDERSON (*Univ. Cal. Chron., 13 (1911), No. 2, pp. 164–176*).—In this address the question as to what is agriculture is discussed, and reasons are given for teaching it. Among these are (1) that the youth may be brought to appreciate the value of small things, (2) for the contentment which it brings, and (3) its usefulness.

The 2 general methods employed in presenting agriculture to pupils of secondary grade, viz, in the special and in the regular schools, are considered closely.

New York agricultural schools, H. E. Cook (*Ann. Rpt. Comr. Agr. Vt., 2 (1910), pp. 153-158*).—An account is here given of the work accomplished during the first three years of existence of the school of agriculture of St. Lawrence University.

The 60 acres of land connected with the school grew about enough grain and forage the first year to keep 3 horses, but the third year saw $941 left after paying every dollar that went into seed, fertilizers, and labor. This increase, according to the dean of the school, has had more to do with putting the institution on its feet than all the talking he could do.

A year of agriculture in a rural Vermont high school, H. A. Farrar (*Middlebury [Vt.] Col. Bul. 5 (1911), No. 5, pp. 44*).—The exercises which have formed the basis of the first year in agriculture in a typical rural Vermont high school are here presented. There are 22 exercises on soils and fertilizers with one or more references after each. The major portion of the volume is taken up with an annotated bibliography of agricultural education literature.

[Agricultural and forestry education in Australia] (*Land u. Forstw Unterrichts Ztg., 23 (1909), No. 3-4, pp. IV+167-310*).—This report contains (1) special papers as follows: The Importance of Commercial Instruction at the Agricultural and Forestry Schools; Modern Agriculture in its Relation to Natural Science and Technology, by Franz Schindler; Practicums in the Secondary Agricultural School Course, by Rudolf Wessely; Preliminary Practical Work in Forestry and Practical Instruction in the Lower Forest Schools, by Karl Pusch; Instruction in Political Science at Technical Educational Institutions, by Ludwig Fleischner; Training our Girls in Housekeeping, by Franz Brosch; Present Status and Organization of Agricultural and Forestry Schools in Germany; Regulating the System of Agricultural Apprenticeship in Germany; and Report on Rural Continuation Schools in Prussia; (2) a review of agricultural literature and book notices; (3) a summary of the annual reports of the agricultural and forestry schools for 1908-9; and (4) miscellaneous notes.

The organization and development of agricultural, industrial, and commercial instruction in Egypt, S. H. Wells (*Egypte Contemporaine, 1911, No. 7, pp. 344-369, dgms. 4*).—This is a study, prepared at the request of the president of the Khedivial Society of Political Economy, Statistics, and Legislation with the sanction of the minister of public instruction, to show particularly how agricultural, industrial, and commercial instruction is administered, its aim, recent progress, and future development.

The only schools in Egypt giving instruction in agriculture at present are the school of agriculture at Ghizeh and 3 industrial schools with agricultural sections at Damanhour, Tough, and Luxor, but local contributions to the amount of $289,165 have been made for the erection and equipment of industrial and agricultural schools. All of these schools are under the control of the minister of public instruction, who received for the department of agricultural and technical education an appropriation for the current year of about $450,000, of which $41,521 was for schools.

Agricultural winter schools, J. B. Guillon (*Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), No. 4, pp. 419-432*).—This report on the organization and services rendered by the agricultural winter schools in France was made in response to a request from the minister of agriculture before authorizing an increase in the number of such schools. The author gives a general outline of the aim and definition of agricultural winter schools, brief notes on those in Germany, Austria, and the Netherlands, and more detailed information on the organization and development of these schools in France, together with detailed accounts of the organization, budget, employment of time, subject matter, etc., of individual winter schools located in lyceums, colleges, professional schools, etc.

Report of the work of the school gardening association in 1909 and 1910 (*Ber. For. Skolehav. Virks.* [*Denmark*], *1909–1910, pp. 38, map 1*).—This report contains a brief summary of the school-garden work in Denmark in 1909 and 1910, followed by accounts of the work of individual gardens, statements of receipts and expenditures of the association for 1909 and 1910, and a map showing the location of the school gardens, of which there were 55 in the spring of 1911.

Manual of agriculture for the public schools, State of Vermont, G. L. GREEN, L. C. COOK, and T. J. ABBOTT (*Montpelier: Dept. Ed., 1911, pp. 16*).—This manual consists of elementary exercises which require only simple apparatus for their performance, with explanations and observations. The general outline of the exercises includes the object, materials, directions, observations, conclusions, and references. The subjects treated are soils, plant life, plant growth, field crops, forestry, animal life, and score cards for potatoes, vegetables, cheese, butter, and dairy cattle. A list of a few desirable books is given at the close of the manual.

Agricultural geography in the high-school course, P. HILLMANN (*Fühling's Landw. Ztg., 60 (1911), No. 9, pp. 289–297*).—This article discusses the need of instruction in agricultural geography in high schools; the subjects it should include, such as (1) the most important natural fundamentals—climate, the agricultural value of a country with reference to its natural vegetation and soils, and (2) the economic fundamentals—commercial conditions, labor, and credit; several methods of grouping this subject matter for purposes of instruction; and suggestions concerning literature.

Proceedings of the twenty-fourth annual convention of the Association of American Agricultural Colleges and Experiment Stations, held at Washington, D. C., November 16–18, 1910, edited by J. L. HILLS (*Proc. Assoc. Amer. Agr. Cols. and Expt. Stas., 24 (1910), pp. 218*).—An account of this convention has been given (E. S. R., 24, p. 108).

MISCELLANEOUS.

Twentieth Annual Report of North Dakota Station, 1909 (*North Dakota Sta. Rpt. 1909, pp. 99, figs. 2*).—This contains the organization list, a brief report by the director, departmental reports, of which the experimental work is for the most part abstracted elsewhere in this issue, and a financial statement for the fiscal year ended June 30, 1909.

Twenty-first Annual Report of North Dakota Station, 1910 (*North Dakota Sta. Rpt. 1910, pp. 59*).—Data similar to the above are reported for the fiscal year ended June 30, 1910.

Experiment Station Work, LXIV (*U. S. Dept. Agr., Farmers' Bul. 457, pp. 24, fig. 1*).—This number contains articles on the following subjects: Low-grade fertilizers, Japanese cane for forage, fighting the boll weevil by clean farming methods, hastening maturity of cotton with fertilizers, the Scuppernong as a profitable crop, early spring lambs in the South, the production of sanitary milk, lacto—a new and healthful frozen dairy product—and a reenforced brick silo.

NOTES.

Arkansas University and Station.—G. A. Cole has resigned as professor of agricultural education and superintendent of farmers' institutes to become principal of the State Agricultural School at Russellville. The farmers' institutes in the future are to be in the immediate charge of the dean of the college. W. Lenton, professor of veterinary science and veterinarian, is no longer connected with the institution.

The first of a series of agricultural trains is to be run over the Frisco Railroad in December. It is planned to make half-day stops rather than hour stops as formerly.

California Station.—F. M. Hayes, of the Kansas Station, has accepted a position as assistant veterinarian.

Colorado Station.—G. P. Weldon has resigned as field agent at Grand Junction to become deputy state entomologist at Fort Collins.

Delaware College and Station.—Dr. M. T. Cook has resigned as plant pathologist to become professor of plant pathology in Rutgers College and plant pathologist in the New Jersey College Station. Dr. Raymond C. Reed has accepted the position of professor of veterinary science in the college and veterinarian in the station.

Florida University and Station.—A total appropriation of $165,000 was made to the university for the ensuing biennium, of which $30,000 was for a new building for the college of agriculture and $15,000 for farmers' institute work. Dr. E. W. Berger resigned as station entomologist July 1 to become state inspector of nursery stock, and has been succeeded by J. R. Watson, of the department of biology of the University of New Mexico. W. Voorhees has succeeded Mrs. Berger as librarian. Owen F. Burger has been appointed assistant plant pathologist. J. B. Griffith, of Southerland College, and F. M. O'Byrne, of Miami University, have been appointed laboratory asistants in plant pathology and plant physiology, respectively.

Idaho University.—H. A. Wadsworth has been appointed assistant professor of forestry in the school of forestry.

Illinois University and Station.—Courses have been added in farm accounting, the economic history of agriculture, and poultry husbandry. A wing 120 by 20 feet of the proposed poultry house has been erected, and 20 acres set aside for the use of the new department. D. O. Barto, formerly instructor in agriculture for secondary schools, has been appointed associate professor of poultry husbandry, and will have charge of the poultry work.

Recent appointments in the department of dairy husbandry include W. Truman Crandall, a graduate of the University of Missouri and for two years in charge of dairy husbandry work in Alfred University, as instructor in milk production; H. E. McNatt, of the Missouri University and Station, as instructor in municipal and sanitary dairying; R. S. Hulce, a graduate of the University of Wisconsin, as assistant in milk production; J. P. Terry, a graduate of Cornell University, as assistant in dairy manufactures; and F. E. Jorgensen as dairy field assistant.

Other appointments include W. F. Handschin, of the Minnesota University and Station, as assistant animal husbandman; Sleeter Bull as assistant in animal nutrition; Fred Bauer as assistant in soil fertility; Dr. W. B. Gernet as assistant in plant breeding; Harry W. Anderson as assistant in pathological floriculture; and Miss Cora Gray and Miss Pauline Wurster as instructors in household science. F. C. Grannis has resigned as assistant in soil fertility to assume charge of the agricultural department of McKendree College.

Kansas College and Station.—Drs. E. C. Miller and N. E. Stevens have been appointed instructors in botany in the college and assistant plant physiologist and assistant plant pathologist, respectively, in the station.

Michigan College and Station.—Dr. William H. Brown has resigned as research assistant in plant physiology to become plant physiologist of the Philippine Bureau of Science, and has been succeeded by Dr. R. P. Hibbard, of the Mississippi College and Station.

Montana College and Station.—D. C. Cochran, assistant chemist since August 1, has returned to the Pennsylvania Institute of Animal Nutrition. W. F. Schoppe has been granted leave of absence for one year and has accepted a position as instructor in animal industry at the University of Maine, where he will also engage in graduate work.

Nebraska University.—Val Keyser has resigned to engage in practical horticulture in eastern Nebraska. C. W. Pugsley has been appointed head of the agricultural extension department, also retaining charge of investigations in farm management.

New Hampshire College.—J. H. Foster, of the Forest Service of this Department has been appointed professor of forestry, and has entered upon his duties.

New York State Station.—Rudolph J. Anderson has been appointed associate chemist and Orrin B. Winter, of the Michigan College, assistant chemist.

Cornell University and Station.—The extension work in the college of agriculture, for which the State has appropriated $50,000, is to be administered by special officers in the various subject matter departments, and also by a separate department of extension teaching. This separate department is to have charge of such publicity and organizing work as does not fall to the subject matter of the different departments, such as lecture courses, reading courses, itinerant schools, farm trains, and the like. Clyde H. Myers is to be extension instructor in plant breeding, R. P. Trask assistant in extension work in poultry husbandry, E. R. Minns assistant professor in extension work in farm crops, and Mrs. Ida S. Harrington instructor in extension work in home economics.

The work in farm management has been organized as a separate department, with G. F. Warren as head, K. C. Livermore as assistant professor, and A. L. Thompson as instructor. The work in farm crops has been united with the department of farm practice and is in charge of Prof. J. L. Stone.

The department of entomology is now known as the department of entomology, biology, and nature study, with Prof. J. H. Comstock as head of the department; Dr. J. G. Needham professor of general biology, limnology, and nature study; Dr. W. A. Riley assistant professor of entomology; Glenn W. Herrick assistant professor of economic entomology; James C. Bradley assistant professor of systematic entomology; and Anna B. Comstock lecturer in nature study, together with a number of assistants and instructors.

In the department of plant pathology D. Reddick has been advanced to a full professorship, M. F. Barrus has been made assistant professor in extension teaching, and Charles Gregory assistant in grape-disease investigations.

E. O. Fippin is to have charge of the extension work in soil technology, particularly of the soil surveys. Other changes include the advancement of assistant professors White, Needham, Fleming, Love, and Gilbert to full professorships, and Messrs. Knudson and Beal to assistant professorships. E. Gorton Davis has been appointed assistant professor of rural art and Ray E. Deuel instructor in animal husbandry. A department of rural education is in process of organization, as is also a department of meteorology in its relations to agriculture.

Two buildings are under construction, the home economics building, for which the State has appropriated $154,000, and the poultry building for which $90,000 is available. Plans are being prepared for an auditorium for which $138,000 is authorized, a heating plant to cost $50,000, and a general horse barn to cost $20,000. To make room for the home economics building the old college barns, built many years ago by Professor Roberts, have been taken down. A temporary farm mechanics laboratory has been constructed and an amphitheater for outdoor classes erected in the park in the rear of the college buildings.

The publication of the *Announcer of the College of Agriculture* has been begun. This is to be issued monthly with a view to acquainting the people of the State with the work in progress. It will contain notes on investigations and extension enterprises under way, suggestions as to work in rural schools, reading courses, and other lines of interest A specific object in view is the inclusion of brief summaries of the forthcoming station bulletins. The mailing lists are to be classified and henceforth only those publications of general interest will be sent to the entire list, except upon request. In this way it is hoped to lessen materially the expense of publication of results.

Oregon College and Station.—Plans are being drawn for the new dairy building which it is estimated will cost $30,000. The exterior will be of brick and stone and the floor of the first story of concrete. The milk, churning, refrigerator, separator, cream, cheese, and wash rooms, as well as the general offices, will be located on the first floor, and the milk-testing laboratory, class rooms, and shops on the second floor.

Recent additions to the station staff include F. C. Reimer, of the North Carolina College and Station, as superintendent of the Southern Oregon substation; R. H. Robinson as research assistant in chemistry; and L. R. Breithaupt as superintendent of the substation at Harney. F. L. Griffin, research assistant in plant pathology, has resigned.

Rhode Island College and Station.—The station has made an exhibit illustrating some of its work in agronomy and also in feeding ducks and in poultry diseases at the chamber of commerce exposition in Boston, which continued through the month of October. The college has shown some of the results of its school garden work in the same connection.

J. I. Falconer has resigned as assistant agronomist to engage in graduate study at the University of Wisconsin.

Texas Station.—David B. Clarkson, of Chicago, has donated $1,000 per annum to be used for cotton breeding and improvement work. It is hoped to supplement this with other funds and thereby to employ a cotton specialist for original research.

The position of agriculturist has been abolished, and H. L. McKnight, who formerly held the position, will be designated hereafter as superintendent of the station farm. A. B. Conner, of the Office of Forage Crops of this Department, has been appointed agronomist.

Washington College and Station.—Under a change in organization, effective October 1, R. Kent Beattie has been relieved of station work in order to devote his entire time to instruction. The department of botany of the station has been abolished, and a department of plant pathology created in its stead with

H. B. Humphrey, the plant pathologist of the station, as head of the new department.

Wisconsin University and Station.—The state legislature authorized a three-eighths of a mill tax for general university purposes. This tax will yield $1,089,000, of which the college of agriculture will receive for the ensuing year approximately $200,000. In addition to this, specific state appropriations for 1911 have been made of $40,000, an increase of $10,000 for agricultural extension, $4,500 for three demonstration farms, $2,000 for the maintenance of substations, $10,000 for the purchase of stump-pulling machines for experimental work, $10,000 for the soil survey, $75,000 for a home-economics building, $90,000 for an agricultural chemistry building, and $235,000 for 187 acres of land purchased by the university adjoining the university farm on the west, and to be used, so far as needed, for agricultural work.

W. D. Hoard, of Fort Atkinson, has resigned as regent. T. E. Brittingham of Madison, T. M. Hammond of Wauwatosa, and Elizabeth Waters of Fond du Lac, have succeeded Lucien S. Hanks, Frederick C. Thwaits, and D. P. Lamoreux as members of the board.

Announcement is made of a new course for public-health officials to be offered during the ensuing year. Applicants must hold a degree in medicine or sanitary science. The course extends through one year and leads to a diploma in public health. Special prominence is given to bacteriology and practical field work in the inspection of slaughterhouses, schools, factories, etc., but instruction is also given in physiology, zoology, meteorology, hydrology, public-health administration and vital statistics, and the microscpic examination of food and drugs.

F. H. King, widely known for his researches in soil physics and as the inventor of the King system of ventilation, died at his home in Madison, August 4, at the age of 63 years. Prof. King was educated at the State Normal School at Whitewater, Wis., and Cornell University. He began his long service in 1873 with the Wisconsin Geological Survey, and was professor of natural science in the River Falls State Normal School from 1878 to 1888. In the latter year he was appointed professor of agricultural physics in the University of Wisconsin, where in the ensuing 13 years much of his best-known work was done. In 1901 he carried on cooperative studies with this Office on the benefits of irrigation in Wisconsin. Soon afterwards he resigned to assume charge of the division of soil management of the Bureau of Soils of this Department. Upon relinquishing this position in 1904 he retired from public service, spending his remaining years largely in writing.

Among the many works from his pen are The Economic Relations of Wisconsin Birds, 1882; The Soil, 1895; Principles of Agricultural Irrigation and Farm Drainage, 1899; The Physics of Agriculture, 1900; and Ventilation for Dwellings, Rural Schools, and Stables, 1908. He had traveled extensively, and was completing at the time of his death a book entitled Farms of Forty Centuries, embodying an account of Chinese and Japanese farming as observed by him during a recent trip to the Orient.

Wyoming University and Station.—The *Wyoming Farm Bulletin* is being published monthly by the college and station staff in succession to the *Ranchman's Reminder*. The general scope of the publication remains unchanged aside from the addition of a section for the answering of inquiries.

S. K. Loy, Ph. D. (Johns Hopkins University), has succeeded Dr. L. Charles Raiford as research chemist at the station, Dr. Raiford having accepted a position at the University of Chicago. Karl Steik has been appointed assistant chemist to study the effects of alkali on cement.

A grant of $3,100 has been made for remodeling the dairy barn.

National Soil Fertility League.—This organization has been recently formed, with headquarters at Chicago, for the purpose of bringing about more intensive cultivation of the soil. As a means to this end the provision of a local expert in each agricultural county, through state and federal aid to the agricultural colleges, is being advocated. Howard D. Gross, of Chicago, is president of the league and James J. Hill is chairman of the advisory committee, of which, among the members are President Taft, Secretary MacVeagh, of the Treasury Department; President E. J. James, of the University of Illinois; Hon. Champ Clark; ex-Governor W. D. Hoard, of Wisconsin; Henry Wallace, of *Wallace's Farmer*, and Hon. William Jennings Bryan.

Fifth International Dairy Congress.—The Fifth International Dairy Congress met at Stockholm, June 28 to July 1, with a large attendance and an interesting program. The sessions were held in the two chambers of the House of Parliament, two sections being formed, one discussing the production of milk and the other its handling and use.

In the first section the effect of foods upon the quality of milk and dairy products received much attention, especially from Messrs. Kellner, Böggild, and Hansson, as regards the effect on fat content. The final conclusions of the congress were in support of the theory that certain foods exercise an influence on the quantity of fat in milk in the case of cows having a high milk yield, but that further work is needed as to the conditions governing such an increase and as to its practical importance. Orla Jensen, of Copenhagen, reported negative results from a long series of experiments on the influence of fertilizers upon forage plants and the subsequent quality of milk and dairy products.

The congress indorsed the efforts of cow-testing associations for dairy improvement. The value of veterinary and other inspection of milk supplies was a subject of much discussion and a commission was appointed to suggest regulations applicable to such supervision.

The second section of the congress considered the questions of requirements to be exacted in milk and dairy products, analytical methods, cheese control, and the instruction of dairymen. A resolution was adopted strongly urging in all dairy publications the use of the metric system and of the centigrade thermometer scale.

Following the congress opportunity was afforded to visit the twenty-first General Swedish Agricultural Exhibit at Örebro, and other points of interest.

Miscellaneous.—Prof. Dr. J. König has retired as director of the agricultural experiment station at Münster, after 40 years' occupancy of the position, and has been succeeded by Prof. Dr. A. Börner, formerly vice director.

Dr. F. Bente, director for many years of the control station for fertilizers, feeding stuffs, foods, and seeds at Ebstorf, Prussia, died July 13.

EXPERIMENT STATION RECORD.

VOL. XXV. DECEMBER, 1911. NO. 8.

The death of Hon. Norman J. Colman, first Secretary of Agriculture, calls to mind the beginnings of the American system of experiment stations and his services at that formative period.

Mr. Colman entered upon his duties as Commissioner of Agriculture on April 3, 1885. He came with the avowed conviction that the position was one of large importance and should be made a Cabinet office, that the Department's work should be strengthened, and that experiment stations for the benefit of agriculture should be established with Government aid in every State in the Union. The attainment of these and other ends for the advancement of agriculture and the recognition of its position he laid before President Cleveland as his program of action, in the interview preceding his appointment. That the latter looked with favor upon such a program is indicated by his selection of Mr. Colman out of a list of some thirty persons who were being considered for the commissionership.

When Mr. Colman came to the Department he found experiment stations in some ten or eleven States, working quite independently and without reference to one another, with no medium for exchange of views or agency for the promotion of their common interests, and no means except the press for giving wider publicity and application to their work. Most of them were small, struggling institutions with meager funds for maintenance, and several of them had no regular series of bulletins, but published their results only in newspapers or college catalogues or reports, where they were not widely accessible.

The development of the experiment station as an American institution remained to be worked out, and there was little or no united effort in that direction. The European station had been transplanted to a quite different environment, and around its successful adaptation centered many problems of organization, management, function and relationship, which needed to be worked out. This called for a closer union between the stations, an exchange of experience and views, and an extension of their interests beyond the boundaries of their respective States.

Commissioner Colman was convinced of this, as he tells us in his first report, and also of the great need of "a more practical cooperation between these institutions and the Department of Agriculture. . . . In a divided condition and without united purpose work will be often duplicated, experiments will be of local value only, and communities alone instead of States will have the benefit of the valuable results of science and practice."

One of his first administrative acts, therefore, only a month after taking office, was to call a meeting of delegates from the agricultural colleges and experiment stations, to be held at the Department, the first official gathering of the kind held in this country and the forerunner of the present Association of American Agricultural Colleges and Experiment Stations. In his call for this meeting he said: "The value of experiments in agriculture is due largely to the uniformity of methods by which they are made, and it is believed that by the comparison of methods which such a convention will permit, much can be done to simplify and unify the processes now in use. Much valuable time and a great deal of money are now lost in desultory and unmethodical experiments, which by concerted action among the various stations and colleges of the country, could be made productive of great good."

The proceedings of this first convention, held July 8 and 9, 1885, clearly show how fully Commissioner Colman was warranted in calling such a meeting and in his belief in the opportunity for more united action. The convention was attended by delegates from every section of the country, and the discussion covered a wide range of subjects and represented a variety of views. A stenographic report of its proceedings, now of much historic interest, was published by the Department.

Commissioner Colman delivered an opening address, in the course of which he presented forcefully and intelligently the need for experimental work in agriculture and the need of the farmer for "a knowledge of the laws—the definite and unvarying principles of physical science, as far as ascertainable," and he impressed upon the agricultural colleges their duty in this direction. "In my judgment," he said, "there is nothing which will attract and rivet the attention of the great agricultural public to our agricultural colleges so much as experimental work. Farmers will hope and expect to be benefited pecuniarily by work of this character conducted at the agricultural college farms in their respective States."

Various measures had been suggested in Congress for establishing stations in connection with the land-grant colleges, and a measure known as the Cullen bill, similar in its general provisions to the Hatch Act, had been introduced. Among the first things which the convention did was to adopt a resolution setting forth "that the condition and progress of American agriculture require national aid for investigation and experimentation in the several States and Territories; and that, therefore, this convention approves the principle and general provisions of what is known as the Cullen bill of the last Congress, and urges upon the next Congress the passage of this or a similar act." So earnest was the convention in this matter that it appointed a committee on legislation, which was very effective in securing the passage of the amended bill.

The convention also expressed its approval of Commissioner Colman's recommendation for a closer relation by adopting a resolution urging the creation of a branch in the Department of Agriculture which should be a special medium of intercommunication and exchange between the colleges and stations, and should publish a periodical bulletin of agricultural progress, containing in popular form the latest results in the progress of agricultural education, investigation, and experimentation in this and in other countries.

Commissioner Colman continued to lend his influence to the securing of Federal appropriation for experiment stations, and in his second report, in 1886, he heartily indorsed the plan for a national system of stations, with provision for cooperation and close communication with one another, and for publicity, so that the work of the stations would be made generally applicable and extended to the country as a whole. Referring to the proposed national legislation, he said: "Without interfering with the organization and management of the State stations, whether at colleges or independent, Federal support may supplement existing agencies and provide through this Department a certain degree of control to secure cooperation where needed and furnish such a medium of intercommunication and exchange as to greatly facilitate and improve the work as a whole."

A bill providing for such a system and embodying these provisions had been introduced by Hon. William H. Hatch, of Missouri, Mr. Colman's State, and referred to the Committee on Agriculture. This committee made a favorable report in March, 1886, and nearly a year later the bill was passed by Congress and was approved by President Cleveland.

Commissioner Colman was greatly gratified at the success of his efforts in establishing closer relations between the Department and the several colleges and experiment stations; and his views in regard to the value of a central agency, for promoting cooperation and intercourse and giving wider publicity to the station work, were embodied in the plans made soon after the passage of the Hatch Act, for the establishing of the Office of Experiment Stations. These plans included the issuing of a journal designated "Experiment Station Record," which was begun in September, 1889, and a series of Farmers' Bulletins to present the results of station work in popular form. The latter was the beginning of the present Department series.

In the organization of this new Office and the development of its plans for aiding the stations and making their work widely available, Commissioner Colman took a deep interest. It was a realization of a plan which he had early called attention to, and he felt that it was one of the important products of his administration.

It was through Commissioner Colman's efforts, also, that the Division of Pomology and the Division of Ornithology and Mammalogy were established in the Department. The latter was in response to a demand for an investigation of the damage done to crops and fruits by birds, especially the English sparrow and the rice bird. Provision was also made for studies in vegetable pathology by the formation of a section in the Division of Botany; and in 1887 legislation and appropriations were secured which made the work of the Bureau of Animal Industry in the control of contagious diseases much more effective. As a result of this, the efforts of the Department in stamping out pleuropneumonia began to show good progress.

On February 9, 1889, the Department of Agriculture became one of the executive departments of the Government, and Commissioner Colman was appointed by the President the first Secretary of Agriculture, retiring with the close of the administration in the following month.

The period covered by Mr. Colman's administration was one of relatively small things as measured by present-day standards. When he came to the Department its annual appropriation was less than $700,000, and at the close of his administration it received something over a million dollars. But it was a time of important change in the Department. It is noteworthy that he took a broad and advanced view for that time of what such an institution should be, recognizing the need of investigation as a basis for substantial advancement of the industry. This is exemplified in the way he took hold of the movement for experiment stations. He not only sympathized with this movement, but he gave it active support, and just how much his influence counted for in securing this legislation has not always been fully appreciated. When the measure had become a law he did not yield to the view that superficial practical work and the popular dissemination of information were the things to be largely encouraged, but he supported higher ideals for the new stations, and he appointed as his representative in the Department's relations with the stations a man who stood for thorough scientific work in the acquisition of reliable agricultural knowledge, of which there had been but little in this country at that period.

We can see now that much depended on the holding up of these higher ideals and a right start at the beginning, and for this we owe much to the position taken by the first Secretary of Agriculture.

Mr. Colman was born at Richmond Springs, N. Y., May 16, 1827, and after studying law at Louisville, Ky., settled in St. Louis in 1852, where he had since resided. There he practiced law, and in 1865 established his agricultural paper, *Colman's Rural World*, which he continued to edit to the close of his life. He was the dean of agricultural editors in the United States, and was for many years a leader in agricultural movements and organizations in the Mississippi Valley. He was a member and former president of the State Board of Agriculture, a founder and first president of the Missouri Horticultural Society, the first president of the Missouri State Fair, and for fifteen years a trustee of the University of Missouri. He conducted a stock farm near St. Louis, and was actively interested in various other agricultural enterprises.

He had received honorary degrees from the Missouri and Illinois colleges of agriculture, and on his retirement from office in the Federal department he was decorated by the Republic of France, through its minister of agriculture, with the cross of "Officier du Merite Agricole."

Mr. Colman celebrated his eighty-fourth birthday last spring, and at that time was the recipient of many congratulations on his excellent health and vigor. He suffered a stroke of apoplexy on November 2, from which he died the following day.

The opportunities for graduate study in agriculture in the United States are presented in an instructive and convenient form in a recent bulletin issued by the United States Bureau of Education (noted on p. 792 of this issue). For the first time data as to the courses available for graduate instruction in agriculture and the related sciences have been gathered in a systematic way from the state colleges of agriculture and mechanic arts, the state universities, and the institutions represented in the Association of American Universities. These are classified by subjects and by institutions, anything like a direct comparison of institutions or attempt at standardization being avoided. The showing made is a gratifying one and brings out the remarkable progress which has been made in this direction within the past decade.

The bulletin is the result of a detailed inquiry undertaken by the Bureau of Education, in cooperation with the Association of American Agricultural Colleges and Experiment Stations, upon the initiative of its standing committee on graduate study. It represents much more than a mere compilation from college catalogues, being rather a thorough study of the situation, in which such factors as the equipment of the institutions to undertake real graduate work and the qualifications of instructors have been given consideration.

Inasmuch as the purpose has been to restrict the inquiry to work of strictly postgraduate grade, institutions with entrance requirements of less than fourteen units of high school work have been, with two exceptions, excluded. Similarly, only courses limited to graduate students, and those undergraduate courses which may be taken by graduate students as major subjects for advanced degrees, have been listed.

Because of these limitations, only twenty-six institutions, of which eighteen are land-grant institutions and four others State universities, are included as meeting the requirements prescribed in the inquiry. As a consequence, there have been omitted many other institutions which offer work in agriculture to their own graduates and those of other institutions whose degrees are equivalent. The bulletin states that no fewer than forty-three of the land-grant colleges are now offering graduate instruction of one type or another, and that "many of the colleges whose courses are not included in this bulletin, owing to their low entrance requirements, have excellent equipment and facilities for research and investigation along a few special lines."

The graduate courses offered at the accepted institutions have been classified under nineteen divisions of agricultural science. It is of interest to note that of the twenty-six institutions, twelve present courses in at least ten of these divisions, five in fifteen or more, and two in seventeen branches.

It appears that botany is the most widely offered of the subjects listed, twenty-two of the institutions offering courses. Of these, sixteen give instruction in plant physiology, ten in plant pathology, and nine in plant breeding. Bacteriology is offered by sixteen institutions. Agricultural chemistry is also well represented, with courses at nineteen institutions. Thirteen offer courses in soils and fertilizers, and a like number courses in physiology and physiological chemistry.

Under the head of agronomy are listed sixteen institutions. Horticulture is offered by thirteen and forestry and landscape gardening by seven each. Animal husbandry may be studied at fourteen of the institutions and thirteen offer courses in animal nutrition. The prospective student in dairying is restricted to nine institutions, in zoology to thirteen, and in entomology to nine.

Despite the comparatively recent organization of instruction in rural engineering and rural economics, these subjects have already reached the graduate stage. Ten of the colleges have advanced courses in rural economics and sociology, and six in agricultural engineering, drainage, and irrigation. Advanced undergraduate work, open to graduates, is available at 1 university in sugar technology and the wine industry, and courses of similar scope at another in theoretical and practical meteorology and climatology.

The data presented in this inquiry should prove of immediate service to the prospective graduate student, for whose needs the bulletin has been primarily prepared, and the publication will also find a wider application as an epitome of the present status of this important phase of agricultural education. Its usefulness received recognition at the recent convention of the Association of American Agricultural Colleges and Experiment Stations. That body formally expressed its appreciation of the work of the bureau in this connection, and urged the desirability of frequent revision of its records, and possibly the ultimate publication of another edition.

While perhaps not the least of the benefits which may be derived from such inquiries is in their suggestiveness as to the lines of study along which the opportunities are still inadequate, there is much reason for encouragement in the showing here presented. When it is recalled that so recently as 1902 the statement was made in these columns that "there has been comparatively little effort in our agricultural colleges in the direction of providing courses of postgraduate instruction in the different branches of agriculture," the advancement here revealed seems significant. The committee on graduate study of the association reported to the recent convention that on the basis of the inquiry it believed the extent of the opportunities now offered for graduate study of agriculture in the United States to be a source of gratification to all interested in the progress of agricultural education.

Now that this country has made a promising beginning in advanced training in agricultural subjects, it is only necessary that the training be recognized to insure further development of true university work in this field. In this connection the services rendered by the Graduate School of Agriculture, through its biennial summer sessions, deserve more active cooperation. As was pointed out by the committee, while the students of the graduate school have been enthusiastic in their commendation of this work, only about one person of every ten who might be expected to be interested has attended its sessions in any one year. In other words, only one out of ten of the total number of officers and assistants in the experiment stations, not including the instructors in agriculture not connected with the stations but to whom graduate study is equally important, has availed himself of its opportunities.

In commenting upon this the committee says: "After making all due allowances, this seems a very low percentage. Research is the lifeblood of the higher education, technical as well as liberal. If the agricultural colleges confine themselves to teaching the things already known, either to their students in the classroom or to the farmer in the institutes and on the demonstration field, their success will be ephemeral. But research of the vital, fructifying kind demands training of a more advanced type than the undergraduate course can possibly give." The committee expressed the conviction that the executive officers of colleges and stations should feel it incumbent upon them actively to encourage their graduates, and particularly those employed in the stations, to perfect themselves in their specialties. It suggested that each institution might well make systematic provision for the attendance of a portion of its force at each session of the graduate school, such attendance to be considered a part of their regular work and not a vacation.

In addition, more extensive and prolonged graduate study than is possible at the graduate school should be encouraged. This may be done, on the one hand, by leaves of absence on generous terms, and on the other by giving preference in appointment, other things being equal, to applicants who have had such training. It is believed that the widespread adoption of such a policy would do much to stimulate the cause of graduate study, and would give good returns in the development of more thoroughly trained men for agricultural research.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

A simplification in the methods for calculating analytical results, A. Scholz (*Chem. Ztg., 34 (1910), No. 121, pp. 1079, 1080*).—After discussing the simplified methods for calculating phosphoric acid from magnesium pyrophosphate, the total dry substance in milk, and the copper from cupric oxid, the author describes methods for shortening the calculations for determining sugar and nitrogen in various products, and acetic acid in vinegar.

Determination of phosphoric acid in superphosphates and bone meal, Z. Románski (*Chem. Ztg., 35 (1911), No. 18, pp. 163, 164; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 5, p. 297*).—The work shows that if the precipitate obtained with magnesium mixture and ammonium citrate is washed with alcohol it will consist of 97 per cent of ammonium magnesium phosphate and 3 per cent of other matter, chiefly magnesium ammonium citrate, which makes such precipitates appear black after ignition and are only whitened with difficulty. In order to prevent such impurities the author recommends that the ammonium citrate and magnesium salt solution be acid in reaction, and to add these to the aqueous extract of the superphosphate under examination and slowly precipitate with ammonia. By doing this a crystalline precipitate of ammonium magnesium phosphate is obtained which is of uniform composition.

The preparation of the reagents and the detailed method of conducting the procedure are described. The results obtained by this method agree well with those obtained with Wagner's method.

A new procedure for determining sulphuric acid and sulphates, V. Auger and M. Gabillon (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 8, pp. 441–443*).—The method rests on the principle of reducing the sulphuric acid or sulphate with hydriodic acid, and determining the hydrogen sulphid formed by titration with iodin solution

Biochemical classification of the proteins, E. Hauser (*Abs. in Chem. Ztg., 34 (1910), No. 95, pp. 848, 849*).—This classification differs from the purely chemical one in so far that it considers the biogenetic relation of these bodies to metabolic processes.

On the refractive indices of solutions of certain proteins.—V, Gliadin, T. B. Robertson and J. E. Greaves (*Jour. Biol. Chem., 9 (1911), No. 3–4, pp. 181–184*).—"The value of a, in the equation $n-n_1=a\times c$ where n is the refractive index of the solution of the protein, n_1 that of the solvent and c is the percentage concentration of the protein, has been determined for gliadin in various solvents.

"In the less highly refractive solvents the introduction of gliadin increases the refractive index; but in the most highly refractive solvent employed, namely 75 per cent phenol, the addition of gliadin reduces the refractive index."

Fractional precipitation of milk proteids, A. J. J. Vandevelde (*Biochem. Ztschr., 29 (1910), No. 6, pp. 461–464*).—The author in a previous work[a] has pointed out that certain transformations can occur between casein and albumin, and with another protein which occurs in colostrum. He furthermore expressed the opinion that casein and albumin were chemically not individual substances, and suggested a nomenclature, α for milk protein precipitated by an acid, β for that protein precipitated from the filtrate from α by the aid of heat, and a third mentioned as γ.

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[a] Biochem. Ztschr., 7 (1908), p. 396.

In his present work he reports a new instance of this kind. In this he fractionated proteins α and β with alcohol (methyl or ethyl) or acetone. He concludes that there are either 2 proteins present, 1 which can be transformed into the other, or that there is 1 present the nature of which is changed by irregular precipitation.

A method for the quantitative determination of aliphatic amino groups; some applications of this in the chemistry of the proteins, urine, and enzyms, D. D. Van Slyke (*Ber. Deut. Chem. Gesell., 43 (1910), No 16, pp. 3170–3181, fig. 1*).—This method has been previously described in detail (E. S R., 23, p. 303).

A method for quantitative determination of aliphatic amino groups, D. D. Van Slyke (*Jour. Biol. Chem., 9 (1911), No. 3–4, pp. 185–204, fig. 1*).—A portion of this work has been previously noted from another source (E. S. R., 23, p. 303).

The additional uses of the method are as follows: "Measurement of the velocity and extent of proteolysis, determination of the relative digestibility of proteins, quantitative determination of proteolytic enzyms, determination of the complexity and structure of peptids and proteolytic products," and for the "characterization of proteins."

Quantitative determination of prolin obtained by the ester method in protein hydrolysis; prolin content of casein, D. D. Van Slyke (*Jour. Biol. Chem., 9 (1911), No. 3–4, pp. 205–207*).—The prolin content of proteins can be rapidly and accurately ascertained by determining the total and amino nitrogen of the alcohol-soluble mixture. It was noted that each of the amino esters, the esters of which distil over with that of prolin, will give off all of its nitrogen when treated with nitrous acid as described in the Van Slyke method (E. S. R., 23, p. 303).

As a result of hydrolyzing 464 gm. of casein and esterfying according to the Fischer method the prolin nitrogen obtained was 3.775 gm., which corresponded to 31.1 gm. of prolin.

The results of attempts to crystallize out the prolin as a copper salt are also reported.

The carbohydrates of white pepper, K. H. Böddener and B. Tollens (*Jour. Landw., 58 (1910), No. 3, pp. 229–231*).—In order to investigate the substances from which furfurol and methyl furfurol (pentosans and methyl pentosans) originate, the authors conducted hydrolyzing tests with white pepper from which all substances soluble in alcohol (piperin, etc.) had been extracted. The sirup which was obtained by hydrolyzing the pepper for 6 hours with 5 per cent sulphuric acid and saturating the extract with calcium carbonate and purifying with alcohol only yielded with phenylhydrazin a phenyl-glucosan having a melting point of 203° C., and which originated from starch. Mannose-hydrazon was not obtained.

Attempts to remove the starch and its products with diastase and autoclaving and subsequent fermentation with yeast yielded negative results. As all the hydrolyzed solutions had an odor of furfurol, and the vapor from such solutions reddened anilin acetate paper, the authors concluded that the pentoses were more or less decomposed by the preliminary treatment of the pepper. In order to determine this, they hydrolyzed and fermented another sample and examined the various intermediate products quantitatively for pentosans and methyl pentosans, with the following results: The extracted pepper before hydrolysis contained 2.21 per cent of pentosans and 1.73 per cent of methyl pentosans. The residue from the pepper after hydrolysis contained 0.29 per cent of pentosans and 0.05 per cent of methyl pentosans, the solution after hydrolysis, 1.79 per cent of pentosans and 1.05 per cent of methyl pentosans, the hydrolyzed solution after fermentation 1.04 per cent of pentosans and 0.33

per cent of methyl pentosans, and the sirup after treatment with alcohol 0.04 per cent of pentosans and 0.19 per cent of methyl pentosans.

A modification of the furfurol-hydrochloric acid method for estimating pentosans, K. H. Böddener and B. Tollens (*Jour. Landw.*, *58* (*1910*), *No. 3*, *pp. 232–237*).—The authors present a modification of the Kröber method (E. S. R., 13, p. 320) for precipitating the furfurol in the distillate with phloroglucin at a temperature of from 80 to 85° C. instead of in the cold as is usual. The furfurol in this method quickly settles in the bottom of the flask as gray-blue-green flakes. The flask containing the distillate, after treatment with phloroglucin, is cooled for 1½ hours and the residue collected on a Gooch crucible, where it is washed with 150 cc. of water and dried at from 95 to 98°. The residue is weighed in a glass-stoppered bottle.

In regard to the pentosans of some wood-destroying fungi, J. L. Wichers and B. Tollens (*Jour. Landw.*, *58* (*1910*), *No. 3*, *pp. 238–242*).—This work, while dealing with the pentosan content of various wood-destroying fungi, contains also a comparative study of the Kröber method (E. S. R., 13, p. 320) and the Böddener method (see above), and as the result of which the authors recommend the use of the Kröber method for general analytical purposes.

The results of the pentosan examinations were as follows:

Pentosan content of several wood-destroying fungi.

Kind of fungus.	Kröber method.	Böddener method.	Kind of fungus.	Kröber method.	Böddener method.
	Per cent.	*Per cent.*		*Per cent.*	*Per cent.*
Polyporus pinicola	5.25	5.52	*Schizophyllum commune*	3.01	2.75
Do	5.71	5.41	*Paxillus panuoides*	2.61	....
Fomes fomentarius	3.34	2.88	*Pholiotha lucifera*	3.27	....
Trametes odorata	2.52	1.80	*Lenzites flaccida*	6.73	6.48
Dædalea quercina	2.93	2.41	*Coniphora membranacea*	4.10	3.55
Xylaria polymorpha	....	1.21			

In addition to pentosans, methyl pentosans were found to be present in these fungi. The results of a hydrolysis of *Fomes fomentarius* are also reported.

The determination of pentosans and methyl pentosans in cereals and fungi, M. Ishida and B. Tollens (*Jour. Landw.*, *59* (*1911*), *No. 1*, *pp. 59–67*, *fig. 1*; *abs. in Chem. Abs.*, *5* (*1911*), *No. 15*, *pp. 2507*, *2508*).—The results for pentosans and methyl pentosans calculated to dry substance were as follows: "Corn 4.60 and 0.94 per cent, wheat 6.93 and 1.72, rye 8.41 and 1.60, barley 9.04 and 1.96, oats 12.39 and 1.52, *Polyporus fomentarius* 2.58 and 1.74, *P. pinicola* 5.11 and 2.21, *P. hirsutus* 4.62 and 2.08, *P. fulvus* 4.10 and 1.01, *Dædalea quercina* 3.05 and 1.17 per cent."

Pentosans in lower fungi, A. W. Dox and R. E. Neidig (*Jour. Biol. Chem.*, *9* (*1911*), *No. 3–4*, *pp. 267–269*; *abs. in Chem. Abs.*, *5* (*1911*), *No. 15*, *p. 2488*).—Six saprophytic molds, comprising the species *Aspergillus niger*, *A. fumigatus*, *A. clavatus*, *Penicillium chrysogenum*, *P. camemberti*, and *P. expansum*, were separated from a medium which consisted of cane sugar and inorganic salts, and the pentosan content of each determined. It varied between 0.86 and 1.17 per cent.

Fixing and staining tannin in plant tissues with nitrous ethers, A. E. Vinson (*Bot. Gaz.*, *49* (*1910*), *No. 3*, *pp. 222–224*, *figs. 3*).—In connection with other work the author noted that the giant tannin cells contained in unripe dates and persimmons were darkened when stimulated to ripening by vapors of amyl and ethyl nitrite, and he points out that the above facts may be of value in studying the distribution of tannin in fruits.

"For laboratory use a 20 per cent alcoholic solution, made by diluting the 90 per cent commercial nitrous ether, is recommended. Amyl nitrite may be used, but is disagreeable to work with. Ordinary sweet spirits of niter, which contain about 4 per cent ethyl nitrite, may be used, but will require much longer exposure."

Botanical micro-chemistry, GRÜSS (*Osterr. Chem. Ztg., 13 (1910), No. 23, pp. 289, 290*).—This article deals particularly with the guaiac reaction, peroxidases, oxidases, oxygenases, diastases, and other plant substances which give the reaction for peroxidase, etc.

The artificial coloration of foods and condiments, E. SPAETH (*Pharm. Zentralhalle, 51 (1910), Nos. 22, pp. 467–472; 23, pp. 495–501; 24, pp. 525–534; 25, pp. 557–560; 26, pp. 584–587; 27, pp. 614–618; 28, pp. 635–638; 41, pp. 935–948; 42, pp. 959–966; 43, pp. 987–991; 44, 1015–1018; 45, pp. 1037–1039; 46, pp. 1054–1058; 47, pp. 1076–1079; 48, pp. 1103–1106; 49, pp. 1122–1125*).—This is an extensive and critical discussion in regard to the advisability and legality of the artificial coloring of foods, condiments, and beverages. The various colors employed and the methods used for detecting them are considered. The decisions of numerous courts are appended in each case.

Fruit juices and marmalades, E. SPAETH (*Ztschr. Riech u. Geschmackst., 2 (1910), Nos. 14, pp. 155–157; 15–16, pp. 165–167*).—This is a retrospect of the work done in regard to the judging and analysis of fruit juices and marmalades during the last few years. The more recent methods of analysis are described.

Composition of Tunisian olive oils, R. MARCILLE (*Ann. Falsif., 3 (1910), No. 23, pp. 372–379; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 20, p. 1212*).—This reports analyses of 550 samples of Tunis olive oils, representing all of the oils exported from the country from December 1, 1908, to March 31, 1910.

"The iodin values (Wijs) obtained were: Sfax oils 82.1 to 86.7, Sahel oils 81.2 to 84.5, Tunis oils 87 to 92.8. The liquid fatty acids separated from the oils had iodin values varying from 104 to 108. Certain of the oils from the Sfax and Sahel districts yielded color reactions similar to, but not identical with, those given by sesame oil; no less than 70 per cent of the oils from the Tunis district gave these reactions. The acidity of the oils was extremely low, 85 per cent of the total number of samples showing an acidity of less than 1 per cent."

See also a previous note (E. S. R., 22, p. 310).

Estimation of lecithin in oil, W. FRESENIUS and L. GRÜNHUT (*Ztschr. Analyt. Chem., 50 (1911), No. 2, pp. 90–106; abs. in Analyst, 36 (1911), No. 421, pp. 166, 167*).—The method is as follows:

Fifty gm. of the fixed oil or fat is weighed in a 200 cc. graduated cylinder and agitated for 20 minutes with 100 cc. of absolute alcohol, allowed to stand for 1 hour, and the volume of alcohol and oil noted. Seventy-five cc. of the alcoholic solution is then pipetted off for the primary phosphorus determination. The pipette is washed out with absolute alcohol, and the washings added to the graduated cylinder, which is then filled up to the original mark with absolute alcohol. The shaking process is repeated, and after separation of the layers has again taken place another 75 cc. of alcoholic solution is drawn off for a second phosphorus determination. The 2 alcoholic solutions, which are termed a_1 and a_2, are evaporated separately in a platinum dish and the dry residue fused with a mixture of sodium carbonate and nitrate. The phosphoric acid in the fused residue is precipitated with molybdic acid in the usual manner, ignited, dried, and weighed.

Two preparations of lecithin in oil were found to contain 3.11 and 7.8 per cent of lecithin, respectively.

Some further contributions in regard to the examination and judgment of milk, H. LÜHRIG and L. KRESSNER (*Molk. Ztg. [Hildesheim], 25 (1911), No. 29, pp. 523–526*).—Continuing previous work (E. S. R., 25, p. 207), the authors point out that hydrogen peroxid does not influence the refraction of a calcium chlorid milk serum, except that which follows the dilution by ordinary water and providing that the addition of this substance remains within certain limits (3 per cent H_2O_2). Lactic acid was found to alter the refraction of the serum in direct proportion to the amount added.

The authors were not able to agree with Mai and Rothenfusser, however, in regard to the undesirability of using spontaneously coagulated serums for determining the refraction. From some additional tests in regard to the relation of the specific gravity to the refraction of the spontaneous milk serum, they believe that just as good results can be obtained with such a serum as with the calcium chlorid serum.

The original acidity of milk, F. BORDAS and F. TOUPLAIN (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 19, pp. 1274–1276; abs. in Chem. Zentbl., 1911, II, No. 1, p. 44; Ann. Falsif., 4 (1911), No. 32, pp. 297–301*).—Milk reacts alkaline with helianthin and lacmoid, while with phenolphthalein it reacts acid and with litmus amphoteric. The authors believe that the apparent acidity shown toward phenolphthalein is due to free casein. Milk, according to this, originally contains no free acid (lactic or citric) nor an acid salt. When fermentation of lactose sets in the acidity increases as a result of the separation of free casein from the calcium caseinate with the formation or monocalcium phosphate from the preexisting dicalcium phosphate. Lactic acid is only detectable with helianthin when the reactions with the respective salts have taken place.

Determination of phosphorus in milk, C. SLONIEWSKI (*Bul. Soc. Chim. Belg., 25 (1911), No. 6, pp. 225, 226; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 14, p. 917*).—As a result of determining the phosphoric acid in numerous samples of milk, the author finds that no appreciable loss of phosphoric acid takes place providing the incineration is conducted below a red heat. Preference, however, is given to the oxidation process, which uses nitric acid, owing to its simplicity and rapidity of execution. He believes that milk contains more phosphorus than the results already recorded show, and points out that there is apparently a constant ratio between the phosphoric acid and the ash, and not between the phosphoric acid and the proteins of the milk. Casein possibly does not contain any phosphoric acid at all.

The determination of phosphorus in milk, F. BORDAS and F. TOUPLAIN (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 17, pp. 1127, 1128*).—This is a reply to Fleurent and Lévi (E. S. R., 25, p. 411), in which the authors have controlled the results obtained by their method (E. S. R., 25, p. 312) which determines the phosphorus in the milk, serum, and coagulum. They do not believe that there is any loss of phosphorus by the action of carbon on the phosphates or the production of volatile phosphorus compounds with the fats.

The authors point out that the addition of foreign substances, such as talcum calcium and magnesium carbonate, barytes, etc., to the milk sample is not to be recommended.

The "neu-sal" milk test, J. GOLDING (*Analyst, 36 (1911), No. 422, pp. 203–206*).—The "neu-sal" method (E. S. R., 23, p. 614) is stated to give satisfactory results when the exact quantity of alcohol is used.

"The fact that it is not pure fat which is being measured, but a solution, the volume of which will vary with the quantity of alcohol used, makes the method inferior in accuracy to the acid Gerber method, a fault which is likely to be increased if it is put into the hands of inexperienced persons. On the other hand, it is cheaper, safer, and more portable, and might be safely recommended to dairy farmers and others, to replace the acid method where this offers serious disadvantages; but the introduction of another possible error will prevent it from replacing the original Gerber method for more accurate work, though the method is a great advance on the previous alkaline methods."

Influence of various preservatives upon the results obtained with the "sal" method in the examination of milk and cream, Hesse (*Milch Ztg., 39 (1910), No. 46, pp. 544, 545*).—The results of a comparative study between the "sal" method and the Gerber method with milks preserved with formaldehyde, potassium bichromate, and copper ammonium sulphate are reported. The Gerber method was found to be influenced to a greater extent by the presence of preservatives in milk and cream than the "sal" method.

Determination of fat in butter by the "sal" method, M. Kersten (*Molk. Ztg. [Hildesheim], 24 (1910), No. 18, pp. 311–313*).—In order to determine the value of this method for butter in the hands of practical men, the author selected a number of students, etc., to try it out. The results obtained were compared with gravimetric determinations with the same material, and showed that the "sal" method, when conducted according to specifications and taking particular precaution not to shake the mixture, is a good accurate method.

Recent methods for examining butter for foreign fats, especially vegetable fats, C. Barthel (*Svensk Kem. Tidskr., 22 (1910), No. 5, pp. 106–110*).—A résumé of methods, with particular reference to the detection of coconut fat by means of the phytosterin acetate method and the Polenske number.

Methods of determining ice cream thickeners and household tests for renovated butter and oleomargarine, G. E. Patrick (*Amer. Food Jour., 5 (1910), No. 8, pp. 4–7*).—Previously noted (E. S. R., 13, p. 321; 20, p. 168).

The chemical processes involved in the fermentation of koumiss and kefir.—I, Investigations of koumiss in the Steppes, A. Ginzberg (*Biochem. Ztschr., 30 (1910), No. 1–2, pp. 1–24, dgms. 3*).—Inasmuch as there are various processes going on at the same time in the fermentation of koumiss and kefir, the author points out the impossibility of controlling the process by determining only the acidity. When utilizing various titration solutions such as tenth normal barium hydrate, tenth normal potassium hydrate, or a saturated solution of calcium hydrate, a disagreement among the final results was noted. The author, however, recommends diluting the koumiss with an equal amount of milk and then dividing it into 3 portions. Each of the 3 portions is allowed to ferment 6, 24, and 36 hours, respectively, and at the end of the fermentation period the total acidity, alcohol, and sugar are determined. A parallel biological examination is also made.

The flora most active in the fermentation of Katyk koumiss from mares' milk was found to consist of a long rod which often appeared in chains, simulated leptothrix, and an organism belonging to the true saccharomycetes or, possibly, to the torulæ.

The author further points out that the formation of peptones is not directly the result of a biological process, but is simply an ordinary hydrolysis of the proteins by acids.

As a result of making a parallel study of the decomposition of lactose and the formation of alcohol and lactic acid, it could be noted that at the beginning of the process only a slight production of alcohol took place, but it increased abruptly as soon as the yeast began to multiply and the sugar began to be decomposed. The lactic acid and alcohol formation became intense only when a certain equilibrium was established, and the competition between the yeast fungus and lactic acid bacterium became less.

The composition of koumiss and kefir is given and compared.

The chemical processes involved in the fermentation of koumiss and kefir.—II, Artificial koumiss and kefir, A. Ginzberg (*Biochem. Ztschr., 30 (1910), No. 1–2, pp. 25–38, pl. 1, dgm. 1*).—The koumiss utilized in this work was prepared with beer yeast for the production of the alcohol and Grigoroff's *Bacillus bulgaricus* for the production of lactic acid, etc., and with mares' and cows' milk. The kefir was prepared with kefir grains.

The work shows that the various processes in the kefir fermentation proceed much slower and less intensely than the koumiss fermentation, and that only 1 per cent of alcohol is produced and one-half of the quantity of the lactose is decomposed. With koumiss the alcohol content rises as high as from 2 to 3 per cent.

The author points out the advantage of establishing purely chemical limits which are based on the intensity of the fermentation process, and to eliminate such terms as weak (young and old), medium (young and old), and strong (young and old).

A number of practical hints on the preparation of koumiss and kefir are also given.

The determination of camphor, H. C. Fuller (*U. S. Dept. Agr., Bur. Chem. Circ. 77, p. 1*).—As camphor is extensively used in medicine, and the United States Pharmacopœia contains preparations which must legally contain definite amounts of camphor, the author has elaborated a procedure for determining this substance. It is based on the fact that camphor forms with hydroxylamin a well defined oxim ($C_{10}H_{16}NOH$).

Quantitative estimation of nitric acid in vegetable products, K. Krog and J. Sebelien (*Chem. Ztg., 35 (1911), No. 17, pp. 145, 146; abs. in Analyst, 36 (1911), No. 421, pp. 163, 164*).—According to the authors Tiemann's modification of Schloesing's method, when used for determining nitric acid in vegetable products which contain much sugar (beets), yields inaccurate results owing to the reducing influence of the carbohydrates. While it is possible to remove the saccharose by precipitation as barium sucrate, the invert sugar which accompanies it can not be removed in this way

In this connection the authors tested the value of Busch's nitron method (E. S. R., 16, p. 945) with aqueous and alcoholic extracts. The method gave with an alcoholic extract 1.65, and with the aqueous extract 1.63 per cent. Schloesing's and Tiemann's methods, on the other hand, yielded only 1.38 per cent. The authors have introduced certain modifications into the Busch method.

Determination of malic acid, P. B. Dunbar and R. F. Bacon (*U. S. Dept. Agr., Bur. Chem. Circ. 76, pp. 12*).—A neutralized solution of malic acid when treated with uranyl acetate shows an increase in rotation which corresponds to approximately 28° Ventzke for each per cent of malic acid present in the solution. This principle is recommended by the authors for estimating malic acid quantitatively in substances free from d-tartaric acid, which is affected in the same way, by treating its solution with uranyl acetate, polarizing, and multiplying the difference obtained between this reading and a reading made of an untreated portion of the solution by 0.036. This represents the amount of malic acid present.

The most favorable limits of concentration for the method were found to lie between 0.2 and 2.5 per cent, and the percentage of error was never found to exceed 5 per cent of the malic acid present. The method, according to the authors, differs materially from the one previously noted (E. S. R., 24, p. 612), and with it 12 determinations can be made with ease in a few hours' time. If, however, more than 10 per cent of reducing sugars and less than 0.25 per cent of malic acid are present, the uranyl acetate exerts its influence upon the sugars, and, therefore, when the approximate amount of sugar or malic acid is unknown some simple modifications must be made in the procedure. Numerous tests illustrating the above points, as well as some malic acid determinations in solutions (strawberry juice) containing an unknown amount of malic acid, accompany the description of the method.

Principles and practice of cider making, B. T. P. BARKER (*Jour. Inst. Brewing, 17 (1911), No. 5, pp. 425–441, figs. 2; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 14, pp. 915, 916*).—Apples designed for cider production may be classified into a sour or sharp group, in which the malic acid content is above 0.45 per cent, a sweet class where the acidity is below 0.45 per cent and the tannin below 0.2 per cent, and a bitter-sweet group in which the malic acid is below 0.45 per cent but in which the tannin content is above 0.2 per cent. The kind of juice obtained from a certain apple is never constant and will always be found to differ with the seasons and the nature of the soil.

"Attempts to obtain a more regular type of fermentation by the use of selected yeasts have not led to very satisfactory results; this is not surprising in view of the variation in quality of the different juices due to the miscellaneous character of the raw material employed. It is quite possible that if a more or less standard quality of juice could always be used, fermentation with pure cultures would give more satisfactory results than natural fermentation. There are usually from 6 to 12 different kinds of yeasts naturally present in the juice; some are not numerous and are soon crowded out. During the earlier stages of fermentation, yeasts of the [*Saccharomyces*] *apiculatus* type appear to be most numerous, while *ellipsoideus* yeasts predominate at a later stage, and when the fermentation is finished and the cider has partly matured, a number of minute torula-like yeasts become conspicuous.

"Acetification is one of the most troublesome disorders of cider and ropiness is also of common occurrence, but the most characteristic cider disease is that known as 'sickness.' This disease is very liable to appear in sweet ciders during May and June. At present there is no satisfactory method of preventing the disorder in cask, but the cider may be rendered less liable to sickness by blending the sweet type of juice with juices which normally ferment more rapidly, or by using a comparatively large proportion of apples of the sharp class, or by bottling the cider at a very much earlier date than usual."

The principles of wine making, F. T. BIOLETTI (*California Sta. Bul. 213, pp. 395–442, figs. 4*).—This bulletin discusses in detail the nature of wine, the biological theory of wine making, causes of variation in character and quality, the operations of wine making, the relation of micro-organisms, causes of fermentation, the micro-organisms found in grapes and wine, and the control of the micro-organisms before, during, and after fermentation.

The significance of mineral salts in vinegar fermentation, H. WÜSTENFELD (*Deut. Essigindus., 14 (1910), No. 38, pp. 275, 276*).—A discussion in regard to the functions of various mineral salts in the vinegar fermentation process.

Paints; their service condition, E. F. LADD and E. E. WARE (*North Dakota Sta. Bul. 92, pp. 173–202, figs. 42*).—"In compiling this report on conditions of test fences painted in 1906, 1907, 1908 and test houses painted in 1907, 1908, 1909, an endeavor has been made so to group the results as to bring together paints of similar type, thus to facilitate the comparison of such similar types under varying conditions, as well as to show the action of differing types under identical conditions of exposure." See also previous notes (E. S. R., 22, p. 710; 23, pp. 168, 371, 692; 25, p. 115).

METEOROLOGY—WATER.

The Russian Bureau of Agricultural Meteorology. Meteorological critical periods and crop growing. Agricultural forecasting, P. I. Brounov (*Kratkii Ocherk Die͡iatel'nosti Meteorologicheskago Bi͡uro za Vremi͡a Ego Sushchestvovaniia. St. Petersburg, 1910; rev. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 4, pp. 794–796*).—This bureau, which was organized in 1896, has accumulated a large amount of data bearing on the relation of meteorological factors to the life of cultivated plants and throwing light especially on the critical period of each plant. This work is prosecuted through a system of agricultural-meteorological stations established in 1907 throughout Russia in which the action of meteorological factors on the soil, growth of cultivated plants, and the life of domestic animals is studied. The first work of the bureau was published in 1908 and dealt with "the action of meteorological factors on the growth in the chernozem, or 'black soils'" (E. S. R., 23, p. 117). Similar studies have been made with wheat, rye, millet, and corn. Another subject of investigation has been the effect of meteorological factors on the composition of cows' milk in Siberia. A system of forecasts based upon the color of the atmosphere has been successfully inaugurated.

The soils of Russia have been classified on the basis of studies of the action of climate on soils.

An atlas of agricultural meteorology and various other popular publications have been issued.

Changes in climate since the last glacial period (*Die Veranderungen des Klimas seit dem Maximum der letzten Eiszeit. Stockholm, 1910, pp. LVIII+459, pls. 5, fig. 48*).—This is a collection of articles presented at the eleventh International Geological Congress at Stockholm in 1910.

Monthly Weather Review (*Mo. Weather Rev., 39* (*1911*), *Nos. 4, pp. 487–648, charts 10; 5, pp. 649–814, figs. 6, charts 9, maps 2*).—In addition to the usual climatological summaries, weather forecasts and warnings for April and May, 1911, river and flood observations, lists of additions to the Weather Bureau library and of recent papers on meteorology and seismology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 4.—Forests and Floods, by J. W. Smith; Protection Against Frost, by E. W. Gruss; Frost in the Grand Valley and Colorado River Siphon, by F. H. Brandenburg; Variability of Frost Injury on Fruit Buds, by Philena F. Homer (see page 712); Measuring the Snow Layer in Maple Creek Canyon, by A. H. Thiessen and J. C. Alter; Notes on the Rivers of the Sacramento and San Joaquin Watersheds during the Month of April, 1911, by N. R. Taylor; Frost Fighting in California Vineyards, by W. E. Bonnett; Frost Cartridges, by A. G. McAdie; and biographical note on Jesse H. Robinson, 1843–1911.

No. 5.—Drought of 1910–1911 in South Carolina, by H. O. Geren; Tornado Near Howard City, Mich., by C. F. Schneider; Draining the American Bottoms, by C. J. Root; An Excessive Downpour of Rain at Matagorda, Tex., by B Bunnemeyer; Where the Snow Lies in Summer (illus.), by J. C. Alter; Orchard Heating, by A. H. Thiessen (see page 743); Notes on the Rivers of the Sacramento and San Joaquin Watersheds during May, 1911, by N. R. Taylor; Protection against Frost—Frost Candles, by A. G. McAdie (see page 743); Fighting Frost, by J. E. Adamson; Correlation (illus.), by J. W. Smith; and The Trade Winds in Porto Rico, by O L. Fassig.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. Ostrander and R. N. Hallowell (*Massachusetts Sta.*

Met. Buls. 271, 272, pp. 4 each).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during July and August, 1911, are presented. The data are briefly discussed in general notes on the weather of each month.

The probable influence of the soil on local atmospheric radioactivity, J. C. SANDERSON (*Amer. Jour. Sci., 4. ser., 32* (*1911*), *No. 189, pp. 169–184, figs. 2*).—This article reports and discusses the results of determinations of the amount of radium emanation in the underground air in the neighborhood of the Sloane Physical Laboratory of Yale University.

"It was found that 1 cubic centimeter of underground air contains radium emanation equal to the amount in equilibrium with 2.4X10—^{13} grain of radium. This is equivalent to the production, per cubic centimeter of earth, of radium emanation in equilibrium with 8.9X10—^{14} gram of radium.

"A method has been devised by which the amount of thorium emanation present in underground air can be directly measured in an electroscope and compared with the emanation evolved by a known weight of thorium salt. In this manner it was found that the earth in the neighborhood of the laboratory emits per cubic centimeter thorium emanation equivalent to that produced by 1.35X10—^{6} gram of thorium under the standard conditions.

"The important bearing of the emanating power of the soil on the radioactive properties of the atmospheric air in different localities has been pointed out, and a method has been suggested by which the emanating power of the soil and the radioactive character of the underground air can be determined in any given locality."

Buckwheat and frost, I. A. PULMAN (*Ezheg. Dept. Zeml.* [*Russia*], *1909, pp. 70, 71; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 1191, No. 4, p. 816*).—It was found that —1 and —2° C. did no harm to buckwheat seedlings, but at —2.5° the tenderest leaves began to suffer, at —4° nearly all the plants were damaged, and at —6° they were killed. The possibility of developing resistant varieties is discussed and a type developed at the Bogoroditsk station which resists a temperature of —4° is referred to.

Action of weather and moisture in soil on the the growth of buckwheat, I. A. PULMAN (*Ezheg. Dept. Zeml.* [*Russia*], *1909, pp. 67–69; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 4, pp. 814, 815*).—Experiments at the Bogoroditsk experiment station showed that there was a critical period in the life of buckwheat between flowering and the formation of grain. With sufficient rain at this period the yields were good. When conditions were favorable up to the period of flowering and then drought ensued there was a large production of straw but little grain. In the opposite case the yield of straw was less but that of grain higher.

In pot experiments it was shown that the maximum yield was obtained with a constant soil moisture content of 34 per cent from flowering to maturing of grain. A reduction of moisture from 34 to 24 per cent during the period from formation to maturity of grain reduced the yield, but an increase from 24 to 34 per cent during the same period gave a considerable increase of grain.

Effect of weather on the growth of oats and millet, I. A. PULMAN (*Ezheg. Dept. Zeml.* [*Russia*], *1909, pp. 71–74; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 4, pp. 816, 817*).—A study during 10 years of the relation of temperature, cloudiness, and rainfall to the growth of oats showed that "in years of good harvest, during the 10 days preceding formation of the ear there was abundant rain, rather low temperature, and a cloudy sky. In years of bad harvest, during the same period there was very little rain, the temperature was rather high, and the sky clear. Up to this period, whatever the outer conditions, the growth of the oats is uniform and slow; but after the formation of the ears, up to harvest, they grow rapidly in favorable years. Rain is the most important factor, and the critical period is within the 10 days preceding the formation of the ears, generally in June."

Similar studies were made with millet, the results of which have already been noted from another source (E. S. R., 23, p. 117).

Action of soil moisture on the growth of oats, I. A. PULMAN (*Ezheg. Dept. Zeml. [Russia], 1909, pp. 74, 75; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1911, No. 4, p. 819*).—Pot experiments at the Bogoroditsk experiment station showed that the optimum results were obtained with a constant soil moisture content of 34 per cent during the period from the appearance of the head to the setting of the grain, which is considered the critical period of oats; that a decrease in moisture from 34 to 24 per cent at this period decreased the yield 32 per cent; that an increase of moisture from 24 to 34 per cent during this period increased the average yield 11 per cent; and that the number of grains is larger but their size smaller with a constant soil moisture content during this period of 24 per cent.

The fertilizing value of rain and snow, F. T. SHUTT (*Ottawa Nat., 25 (1911), No. 6, pp. 99, 100*).—In continuation of observations previously noted (E. S. R., 24, p. 417) it was found that the rainfall at the Ottawa Experimental Farm during the year ended February 28, 1911, was 19.67 in. and the snowfall 7.3 in., representing a total precipitation of 26.97 in., about 10 in. below the average for the locality. This precipitation furnished 5.271 lbs. of nitrogen per acre. Of the average nitrogen (4.424 lbs. per acre) for the 4 years 1908–1911, 84 per cent was supplied by the rain. Of the total nitrogen, 3.733 lbs. was in the form of ammonia.

[Composition of rain water, British Guiana], J. B. HARRISON (*Rpt. Expt. Agr. Work Dept. Sci. and Agr. [Brit. Guiana], 1909–10, pp. 15–18; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 584, II, pp. 530, 531*).—The average annual rainfall at Georgetown, 1890 to 1909, was 99.27 in., furnishing 1.01 lbs. of nitrogen as ammonia, 1.89 lbs. of nitrate nitrogen, and 129.2 lbs. of chlorin per acre. Of the total nitrogen, therefore, 34.8 per cent was in the form of ammonia and 65.2 per cent in the form of nitrates.

Further experiments on dew ponds, E. A. MARTIN (*Geogr. Jour., 36 (1910), No. 4, pp. 439–464, figs. 4*).—In continuation of previous observations on this subject (E. S. R., 22, p. 118), the author reached a positive conclusion that "rain is undoubtedly the all-important replenisher of these, as of all ponds which are not fed by springs," and that dew plays an insignificant part in this process.

The geology of water supply, H. B. WOODWARD (*London, 1910, pp. XII+339; rev. in Nature [London], 87 (1911), No. 2181, p. 206*).—In this book an attempt is made to set forth clearly the main geological features to be taken into account by the engineer, chemist, or physical geographer in dealing with the problem of water supply, mainly in their application to conditions prevailing in the British Isles. A bibliography of the subject is appended.

The bacteriology of ice, E. O. JORDAN (*Cold Storage and Ice Trade Jour., 42 (1911), No. 1, pp. 31, 32*).—Experimental data are summarized which lead to the conclusion that under suitable conditions freezing is a purification process and that any bacteria which remain in ice tend to disappear on storage. "Natural ice is habitually stored for a considerable period, and this fact materially increases its safety from the public health standpoint. After 3 or 4 months the danger from ice cut from even highly polluted water would be very slight, and after 6 months' storage would be practically negligible"

The significance of flora and fauna in maintaining the purity of natural waters, M. MARSSON (*Mitt. K. Prüfungsanst. Wasserver. u. Abwässer. Berlin,* *1911, No. 14, pp. 1–26; rev. in Engin. News, 66 (1911), No. 9, pp. 246–250; abs. in Wasser u. Abwasser, 4 (1911), No. 9, pp. 377, 378)*.—This is a summary of information bearing upon the rôle played by the aquatic flora and fauna in maintaining the purity of streams and lakes and the effect of domestic sewage and industrial wastes upon such flora and fauna. A list of the scientific works of Dr. Marsson is appended to the article.

Hypochlorite treatment of public water supplies, G. A. Johnson (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 8, pp. 562–574*).—This article discusses briefly the adaptability and limitations of this process and the extent to which it is actually employed in this country.

Industrial sterilization of water with ultraviolet light, M. von Recklinghausen (*Elektrochem. Ztschr., 17 (1910), Nos. 8, pp. 211–216, figs. 3; 9, pp. 244–248, figs. 2*).—The progress in the development of this method of water sterilization is briefly reviewed.

Sewage pollution of interstate and international waters with special reference to the spread of typhoid fever.—I, Lake Erie and the Niagara River, A. J. McLaughlin (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 77, pp. 169, charts 55, maps 16*).—This bulletin discusses the relation of sewage polluted with water supplies to typhoid fever death rate with special reference to conditions along the New York, Pennsylvania, and Ohio shores of Lake Erie, and reports studies of these conditions, indicating a general dangerously contaminated condition of the lake waters drawn upon for the supply of the lake shore towns and cities and requiring purification works of high efficiency.

It is shown that this is a matter of great importance from the interstate and international standpoint, and it is maintained that "prevention or control of pollution of interstate and international waters should be a function of the Federal Government. The problem cannot be handled by States, as uniformity of law and unanimity of opinion is difficult to obtain and almost too much to expect."

Modern methods of sewage purification, G. B. Kershaw (*London and Philadelphia, 1911, pp. XIII+356, pls. 36, figs. 15*).—This book is intended as "a guide for the designing and maintenance of sewage purification works," and deals with the following subjects: Conservancy methods, drainage areas, water supply, sewerage systems, rainfall, storm water, variations in flow of sewage, classification and composition of sewages, considerations to be observed in selecting the site for sewage disposal works, preliminary processes, disposal of sludge, land treatment of sewage, contact beds, percolating filters, trade wastes, and purification works in actual operation. Introductory chapters review the development of sewage purification during the last half century. One of the longest and most important chapters of this book deals rather fully with land treatment of sewage, the merits and limitations of this method being fully presented. The author holds that, with suitable land, moderate volume of sewage to be handled, and intelligent management, land treatment can not be excelled as a means of sewage purification.

Residential sewage disposal plants, R. W. Pratt (*Mo. Bul. Ohio Bd. Health, 1 (1911), No. 7, pp. 228–235, figs. 4; abst. in Engin. and Contract., 36 (1911), No. 16, pp. 407, 408, figs. 4*).—This article briefly discusses the general principles involved in the problem of disposing of sewage from individual houses, describing some of the simpler methods of sewage disposal.

SOILS—FERTILIZERS.

Preliminary report on the Klamath marsh experiment farm, C. S. Scofield and L. J. Briggs (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 86, pp. 10, fig. 1*).—This circular reports the results of preliminary experiments to determine the crop adaptation and the feasibility of leaching the Klamath marshlands, which include about 50,000 acres on the boundary line between Oregon and California.

It is stated that these lands have been formed from disintegrated aquatic vegetation without any considerable quantity of rock residue or silt, and contain injurious amounts of alkaline salts, chiefly sodium carbonate.

"On account of the highly impervious character of the marshland, the leaching out of these alkaline salts is rendered very difficult and appears to be impracticable by any methods at present known. The expense would exceed the prospective value of the land.

"The air-drainage conditions on the Klamath marshlands are such that low temperatures and killing frosts are likely to occur every month in the year, thus limiting the possible agriculture to the hardier species of crop plants."

The conservation of [Iowa] soils (*Rpt. Iowa Drain., Waterways and Conserv. Com., 1909–10, pp. 161–187, pls. 3*).—This article discusses the causes of deterioration of soils, especially as applied to Iowa conditions and urges the study of methods of conservation of their fertility.

A preliminary report on the mountain soils, B. W. Kilgore, E. L. Worthen and W. E. Hearn (*Bul. N. C. Dept. Agr., 32 (1911), No. 5, pp. 52, figs. 9*).—This bulletin reports the results of analyses of, and of fertilizer experiments on, the different soil types of the mountain section of North Carolina, and is based on 11 years' study of these soils to determine the different types, their location, extent, plant food and other constituents, fertilizer needs, and crop adaptation.

The soils are all residuary and are derived from igneous and metamorphic rocks, mainly gneisses, schists, and granites. The upland soils belong to the Porter's series, represented mainly by loam and sandy loam types, and smaller areas by clay, sand, and black loam. The valley and bottom lands are included in the Toxaway series and are of alluvial origin modified by colluvial wash. The two types thus far found are Toxaway loam and Toxaway fine sandy loam.

Although there is considerable variation, the soils as a whole are very high in potash, low in phosphoric acid, and fair in lime content. The amount of nitrogen varies with the quantity of vegetable or organic matter in the soil and is generally low. Fertilizer tests showed that potash did not benefit crops, but that phosphoric acid first, and nitrogen second, are the controlling constituents in increasing yields.

A chemical study of certain Sandhill soils of South Carolina, T. E. Keitt (*South Carolina Sta. Bul. 159, pp. 3–24, fig. 1*).—This bulletin reports the results of mechanical and chemical analyses of the Sandhill soils of South Carolina, and correlates these with past cultural and fertilizer practices on such soils, consideration being given to the distribution of plant food constituents.

The Sandhill region is situated below the fall line and comprises what was once the shore border. "It is believed to have been covered by the Lafayette formation, a very heterogeneous formation, composed of gravel, sand, silt, and clay, which ranges in color from brick red through various shades to white." In some places it has been eroded, and in others it has been covered by later and less gravelly marine formations. It embraces parts of Aiken, Lexington, Richland, Kershaw, and Chester counties.

Analyses of characteristic northwest timber soils, J. S. Jones (*Jour. Indus. and Engin. Chem., 3 (1911), No. 4, pp. 246, 247*).—This article reports the results of analyses of bench, valley, and elevated timber soils of Idaho.

The bench lands have an elevation of about 2,000 ft. The surface soil is a fine sandy loam, shading into a light clay loam at a depth of from 20 to 24 in., which continues to a depth of from 10 to 12 ft. without any material change in physical characteristics.

The valley lands are of alluvial formation, and of variable physical composition. Both the bench and valley lands are being developed for orchard purposes.

The elevated timber land has an elevation of from 2,500 to 3,000 ft., is covered with yellow pine and fir, and is of a rolling character. It is being converted into grain and timothy farms.

The analyses indicate clearly "that extensive areas of typical pine forest soils of the Northwest are well supplied with all of the mineral elements required in plant growth, and are exceptionally rich in phosphoric acid. As a rule, they are slightly acid in reaction, and, although substantial amounts of calcium are present, the application of finely crushed limestone is known to be of decided advantage in bringing them into a good state of cultivation."

Soils of the Gezira, W. BEAM (*Cairo Sci. Jour., 5 (1911), No. 58, pp. 181–189*).—This article reports the results of chemical and mechanical analyses of soils from the Gezira, the triangular section of Sudan which lies between the White Nile and the Blue Nile.

In general the soils are fairly well supplied with potash and phosphoric acid but are markedly deficient in organic matter and nitrogen. The growing of legumes is, therefore, recommended for their improvement.

Contribution to the knowledge of the vineyard soils of Switzerland, N. J. BARAGIOLA and C. GODET (*Landw. Jahrb. Schweiz, 25 (1911), No. 3, pp. 213–224, fig. 1*).—A preliminary test of the vineyard soils surrounding Wadenswyl, Switzerland, having shown a wide variation in their lime content, the authors made a more detailed study of these soils giving attention to mechanical and chemical analyses and the relation between the lime content of the soil and the parent rocks.

Among the more general conclusions it is stated that the soils which were richer in lime contained more suspended matter than sediment. The suspended portion of the soil was generally richer in lime than the sediment and the soils having the most sediment had the least retentive power for water.

The phosphoric acid content was generally somewhat higher in the surface than in the subsoil. The reverse was true of lime and magnesia, the magnesia content increasing practically in the same proportion as that of lime. A substantial part of the lime was present in a form other than that of the carbonate.

The rock particles contained a higher percentage of lime than the soil.

The arsenical soils of Reichenstein, Silesia, H. GRUNER (*Landw. Jahrb., 40 (1911), No. 3–4 pp. 517–557, pl. 1, fig. 1; abst. in Ztschr. Angew. Chem., 24 (1911), No. 41, p. 1976*).—This article reports the results of studies to determine the origin of the arsenic in soils surrounding Reichenstein, Silesia.

It was found that the arsenic had come from the roasting furnaces, and that the parent rock did not contribute to its formation.

The sulphuric acid content of the soil increased with the arsenic, and it is thought that the harmful effects on vegetation and bee culture are in part due to the sulphuric acid, although the soils in the main showed a neutral reaction.

Lime was generally deficient in the soils and it is believed that applications of lime fertilizers would produce increased yields.

Some soils which contained large amounts of arsenic acid were also low in lime, phosphoric acid, and potash, and therefore from them, especially when coupled with such unfavorable physical conditions as generally existed, no profitable yields could be expected.

The weathering of silicate rocks, P. STREMME (*Landw. Jahrb., 40 (1911), No. 1–2, pp. 325–338; abs. in Ztschr. Angew. Chem., 24 (1911), No. 25, p. 1187; Chem. Zentbl. 1911, I, No. 24, pp. 1714, 1715*).—The author discusses the formation of kaolin on the basis of investigations by others and of his own experiments in which he tested the action of different acids on siliceous rocks.

It is shown that sulphuric, nitric, hydrochloric, and hydrofluoric acids decompose kaolin and, therefore, can not have contributed to its formation. Sulphuric and hydrochloric acids in the presence of little water form sulphates and chlorids. With large quantities of water and siliceous rocks they form almost pure silicic acid.

Tourmalin, fluorspar, topaz, and turquoise have nothing to do with the formation of kaolin, even though they are formed in unkaolinized rocks; fluorspar and boron are, therefore, not kaolinizing agents. Neither is hydrogen sulphid such an agent.

All analyses point to the fact that cold water containing carbonic acid is the principal kaolin-forming agent.

Determination of the outer soil surface, E. A. MITSCHERLICH, F. SCHEEFFER, and R. FLOESS (*Landw. Jahrb., 40 (1911), No. 5, pp. 645–659, fig. 1*).—The authors report the results of studies of the hygroscopicity or outer surface area of a number of different soils as determined by Mitscherlich's method, previously described (E. S. R., 24, p. 419).

Although the authors admit that drying the soil produces colloidal changes, they believe that the establishment of vapor tension equilibrium by exposing the soil to 10 per cent sulphuric acid eliminates such colloidal changes or so reduces them as to render them negligible.

The biological stimulation of natural humus, T. REMY and G. RÖSING (*Centbl. Bakt. [etc.], 2. Abt., 30 (1911), No. 16–18, pp. 349–384; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 586, II, p. 758*).—This article reports a series of experiments which were undertaken to determine why the addition of soil to a mannite nutrient solution causes such a great development in the growth and nitrogen-fixing power of *Azotobacter chroococcum.*

The results, in agreement with those of Krzeminiewski, showed that the crude humus acid extracted from soil has an extraordinary influence in promoting the development and nitrogen-fixing power of *A. chroococcum.* It was found, however, that this effect was not due to the humus acids as such, but to the iron which the crude acids contained. Humus acids free from iron produced no such effect as the crude substances, whereas the addition of iron compounds alone to the mannite solution resulted in normal growth of Azotobacter and increased nitrogen fixation. One of the most effective forms of iron was found to be an alkaline solution of iron hydroxid in cane sugar. Iron silicate was also effective for this purpose.

Examination of soils for organic constituents, especially dihydroxystearic acid, O. SCHREINER and E. C. LATHROP (*U. S. Dept. Agr., Bur. Soils Bul. 80, pp. 33, pls. 2*).—"This investigation is a partial survey of the nature of soil organic matter in the soils of the United States. Soils from 18 different States, extending from Maine to Oregon and southward to Texas, of widely different origin, topography, texture, climate, drainage, and cropping, varying from soils of the highest productivity to soils incapable of producing profitable crops, were examined for definite organic soil constituents.

"To facilitate this examination, the numerous individual methods for the separation of these compounds have been so coordinated as to form a single comprehensive procedure of analysis.

"In the soils so examined, pentosans, pentose sugars, histidin, cytosin, xanthin, hypoxanthin, and dihydroxystearic acid were quite frequently encountered and the results indicate that these substances will be found to be widely distributed.

"Argenin, agroceric acid, lignoceric acid, α-monohydroxystearic acid, agrosterol, phytosterol, and hentriacontane were only occasionally found, but no general statement as to their limited occurrence can be made.

"The frequent occurrence of dihydroxystearic acid is of special interest and significance because of its known harmful properties to plants. One-third of all the soils examined showed the presence of this compound. It was found in virgin soils as well as in soils under long cultivation; in soils continually cropped as well as in soils under permanent sod; in soils from the Atlantic coast; in soils from the Pacific coast; and in soils from the Gulf States. This compound is, therefore, a common soil constituent and is likely to be encountered in soils anywhere. Its formation or its accumulation is doubtless due to local conditions in any one section, but these local soil conditions are not confined to any region of the United States and probably not to any country or continent.

"When the soils examined are separated into good and poor soils, as based on field observations, their relationship with dihydroxystearic acid is rather striking. Among the good soils only 2 contained dihydroxystearic acid and they were of only moderate productivity. Among the poor soils the percentage of those containing this compound was 51. Of the soils which had a record for infertility, the dihydroxystearic acid was found in each and every case.

"Judging from the foregoing relationships established by this investigation it would seem that dihydroxystearic acid is either a direct or indirect factor in the low productivity in soils: direct by virtue of its harmful effects on growing crops, indirect as an indicator of other compounds or conditions which cause soil to become less productive and even infertile. It is not possible to state from the data at hand that dihydroxystearic acid is the only factor which contributes to the infertility or unproductivity in those soils in which it was found, for it must be remembered that this is only one of many compounds, both organic and inorganic, harmful and beneficial, which exist in soils, any and all of which play a part in its relative fertility and infertility. It is certain, however, that the determination of even this one constituent leads to a recognition of the kind of infertility in the soils examined and is, therefore, a readily recognized symptomatic factor of poor soil conditions."

The distribution of organic constituents in soils, O. Schreiner and E. C. Lathrop (*Jour Franklin Inst., 172 (1911), No. 2, pp. 145–151*).—This article is based upon results of investigations more fully reported above.

A peculiar soil sickness, J. Hudig (*Landw. Jahrb., 40 (1911), No. 3–4, pp. 613–644, pl. 1; abs. in Ztschr. Angew. Chem., 24 (1911), No. 41, p. 1976*).—Further investigations on the so-called "oat sickness" of the soils of Drenthe and Groningen (E. S. R., 21, p. 115) are reported, and deal with field and pot experiments to test the action of different fertilizers on such soils.

The sickness is not confined to moor soils, as was at first supposed, but occurs also on sandy and clay soils. Although the investigation is not complete, the author believes that the sickness is due to changes in the composition of the humus caused by continued application of lime and physiologically alkaline fertilizers.

A comparison of soil disinfectants, O. Loew (*Porto Rico Sta. Rpt. 1910, pp. 17–19*).—Comparative tests of chlorid of lime, potassium permanganate, tricresol, and carbon bisulphid on "sick" soil planted to lilies are reported. The largest production of flowers and seed was obtained on the plat treated with chlorid of lime, which is considered the best and cheapest of the soil disinfectants tested.

Importance of soil reaction in relation to soil investigations and productiveness, M. Weibull (*Meddel. Alnarps Lab., 1911, No. 12, pp. 32*).—This article reports studies of the extent to which the solubility of the plant food in the soil, the effect of fertilizers, and the yield of crops, depend upon the reaction of the soil.

The results of both analysis and vegetative experiments agreed in showing that acid soils contained smaller amounts of available nitrogen and phosphoric acid and usually lower percentages of potash than neutral or alkaline soils. As a rule, also, yields were lowest on acid soils and highest on neutral and alkaline soils.

Potash in clay and granitic soils, J. Barcia y Trelles (*Prog. Agr. y Pecuario, 17* (*1911*), *Nos. 727, pp. 349–351; 728, pp. 365, 366; 729, pp. 382, 383*).—This article emphasizes the fact that, although determinations of potash may in some cases furnish valuable indications of the potash requirements of soils, analysis is not an infallible guide and should be supplemented by field experiments. It is shown that many soils derived from granites and rich in potash are benefited by potash fertilizers.

Investigations on the action of different proportions of lime and magnesia in some soils on higher plants and micro-organisms, O. Lemmermann, A. Einecke, and H. Fischer (*Landw. Jahrb., 40* (*1911*), *No. 1–2, pp. 173–254; abs. in Chem. Zentbl., 1911, I, No. 25, pp. 1760, 1761; Ztschr. Angew. Chem., 24* (*1911*), *No. 25, pp. 1187, 1188; Jour. Soc. Chem. Indus., 30* (*1911*), *No. 13, p. 821; Chem. Abs., 5* (*1911*), *No. 19, p. 3314*).—The authors report the results of a large number of experiments conducted during 1907, 1908, and 1909 on 6 soil types and with 8 different crops, to determine the action of different proportions of lime and magnesia on plants and soil organisms (bacteria).

It was found that as far as the yield was concerned variations within wide limits in the proportion of lime to magnesia had no effect. It was not possible to increase the yields by maintaining definite proportions of lime to magnesia.

Plants varied in their behavior toward lime and magnesia. Even soils containing only 0.08 per cent lime and 0.04 per cent magnesia, or, 0.067 per cent lime and 0.09 per cent magnesia, gave no increase in yield with many plants from applications of lime and magnesia. It seems necessary, therefore, that in order to draw correct conclusions the same plants must be studied for several consecutive years on the same soil.

The favorable action of lime on the mustard plant was not dependent alone upon the nutritive value of lime, but also upon other factors.

The lime content of grain was much less than that of straw. Grain and straw varied less in magnesia than in lime. Grain contained more magnesia than lime, whereas the straw contained more lime than magnesia.

Variable amounts of lime and magnesia applied to, as well as contained in, the soil influenced more distinctly the composition of the straw than that of the grain.

The lime, magnesia, and phosphoric acid content of plants may vary greatly for substantially the same yields.

The lime-magnesia fertilizers influenced also the utilization of phosphoric acid in that a high magnesia and a low lime content of fertilizer decreased the lime content of the crop, whereas that of the phosphoric acid and magnesia increased.

The varying solubility and absorption of lime and magnesia fertilizers must be considered in the determination of the exact relation of lime and magnesia in the soil.

As with the higher plants, no distinct relation of lime to magnesia could be established as particularly favorable to soil bacteria.

The authors believe that the study of the optimum proportion of all plant nutrients to each other is an important work of the future.

Investigations on the lime requirements of cultivated soils, O. Lemmermann, O. Foerster, and A. Einecke (*Landw. Jahrb., 40* (*1911*), *No. 1–2, pp.*

255-324; abs. in Chem. Zentbl., 1911, I, No. 25, pp. 1761-1763; Ztschr. Angew. Chem., 24 (1911), No. 25, p. 1188; Jour. Soc. Chem. Indus., 30 (1911), No. 13, p. 821; Chem. Abs., 5 (1911), No. 19, p. 3314).—This article reports the results of tests of different methods of determining lime in soils, and correlates these with results of a large number of pot experiments with lime fertilizers conducted during 1905 and 1906 on 10 soil types and with a number of different plants.

It was found that the usual methods of determining lime in soils gave uncertain results, but that the authors' simplified method, extraction with 10 per cent hydrochloric acid, was more satisfactory. The lime content as determined by this method, however, gave no reliable indication of the behavior of the soil toward a lime fertilizer. The lime content obtained by extraction with 10 per cent hydrochloric acid was substantially the same as that from extraction with ammonium chlorid, lower than that for the sulphuric acid extraction, and higher than that for the carbon dioxid solution.

Different plants varied in their behavior toward lime fertilizers and the acidity of the soil. The utilization of the lime of the fertilizer, as well as of the soil, was small, the highest amount being about 4 per cent for the soil and about 5.6 per cent for the fertilizer. There was no relation between the lime taken up by the plants on different soils, and that which was soluble in carbon dioxid solution. There was no constant relation between the lime assimilated by the plants and that soluble in a soil solution.

The authors are of the opinion that mineral soils are more generally acid than is commonly believed, and that the determination of the acid content of soils must be given more attention in the future.

The relation of recent soil investigations to the use of fertilizers, F. K. CAMERON (*Amer. Fert., 35 (1911), No. 3, pp. 52-56*).—This article is in large part a review of soil investigations and a statement of the teachings of the Bureau of Soils of this Department with reference to soil fertility. It discusses the composition and individuality of soils, dynamic properties, natural supply of mineral nutrients, organic constituents, soil management, and the use of fertilizers.

The development of the use of fertilizers from the time of Thaer to the present, GERLACH (*Jahrb. Deut. Landw. Gesell., 26 (1911), No. 1, pp. 145-154*).—A historical review for Germany.

The use of commercial fertilizers on moors, heaths, and marshes, TACKE (*Jahrb. Deut. Landw. Gesell., 26 (1911), No. 1, pp. 137-144*).—A brief review of present knowledge on this subject.

Drill manuring in Hungary, J. GYÁRFÁS (*Deut. Landw. Presse, 38 (1911), No. 17, pp. 193, 194; abs. in Internat. Inst. Agr. [Rome], Bul. Agr. Intel. and Plant Diseases, 2 (1911), No. 4, pp. 824, 825*).—In experiments with barley, oats, rye, and wheat here reported 115 kg. of superphosphate per hectare (102.35 lbs. per acre) applied with a drill gave better results than 345 kg. (307.05 lbs.) applied broadcast.

The loss of ammonia from manured soils, P. EHRENBERG (*Fühling's Landw. Ztg., 60 (1911), Nos. 13, pp. 441-452; 14, pp. 479-500*).—Investigations on this subject are reviewed, showing that when manure is incorporated with the soil there is practically no loss of ammonia but that a considerable loss occurs under certain conditions when the manure is spread on the surface of the soil.

The production of ammonia from peat, N. CARO (*Chem. Ztg., 35 (1911), Nos. 56, pp. 505-507; 57, pp. 515, 516*).—Investigations on the production of ammonia from wet and dry peat by treatment with steam under pressure are reported, showing that the production is larger and more rapid from wet peat and that there is no fixation of atmospheric nitrogen in the process.

Manuring experiments with peat, A. I. DREIMAN (*Zemlcdielets, 1910, No. 3; abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.), 11 (1910), No. 6, pp. 867, 868; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 527, 528*).—In experiments with peat alone and in combination with bone ash, Thomas slag, potash salts, and sodium nitrate on barley grown on sandy soils, it was found that peat alone nearly doubled the yield of grain but that peat mixed with Thomas slag, potash salts, and sodium nitrate did not give as large a yield as a complete mineral fertilizer without peat.

The hygroscopicity of certain new nitrogenous fertilizers, H. VON FEILITZEN and I. LUGNER (*Fühling's Landw. Ztg., 60 (1911), No. 16, pp. 563–568, dgms. 2*).—In comparative tests of samples of Norwegian nitrate and lime nitrogen mixtures, equal parts of the two, and of 2 of lime nitrogen to 1 of Norwegian nitrate, ammonium sulphate, and sodium nitrate, it was found that all of the substances gained considerable moisture in a period of one month, the most hygroscopic being the mixture of 2 parts of lime nitrogen to 1 of Norwegian nitrate, the least hygroscopic lime nitrogen. The Norwegian nitrate and lime nitrogen and both mixtures of the two gained in weight in dry air, the 2:1 mixture showing the largest gain.

Some fertilizer experiments with different potash minerals, H. VON FEILITZEN (*Deut. Landw. Presse, 38 (1911), No. 63, pp. 737, 738, fig. 1*).—The author reports the results of pot and field experiments conducted during 1910 with barley and field peas on moor soils to determine the relative action of phonolite, nephelite, feldspar, and a so-called powdered "aluminite" as compared with the 38 per cent Stassfurt potash salt.

He concludes that although phonolite and nephelite gave an appreciable action, they were far inferior to the Stassfurt salt both in point of yield and potash assimilation. Feldspar and the powdered "aluminite" gave such inferior yields as to merit no consideration.

A new mineral yielding potassium sulphate (*Engrais, 26 (1911), No. 10, p. 272; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, p. 535*).—Attention is called to the discovery in the Province of Almeria, Spain, of a mineral which by calcination and washing yields from 25 to 30 per cent of potassium sulphate. It is called "Galafatite."

The German potash industry, T. J. ALBERT (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 172, p. 377; Engin. and Min. Jour., 92 (1911), No. 6, p. 252*).—It is stated that "at the conference held recently at Hamburg between the conflicting interests, German and American, in the potassium industry, an agreement has been reached as to prices and rebates. The agreement has a duration of 5½ years. During this period the American purchasers of potash obligate themselves to make all purchases from the potassium syndicate. The probability of the market being disturbed by outside mines is thought to be remote, as such outsiders would have to organize a sales agency in the United States similar to the German Kali Syndicate, which delivers potash salts directly to the buyer. Such an organization would be expensive and difficult to effect.

"The basis of prices is practically the same for concentrated salts as that contained in the potassium law, and the same as prevailed in America in 1909 before the syndicate was renewed and before the Schmidtmann contracts went into force."

Potash residues as manure, L. SAPARTOVITCH (*Khoziaistvo, 6 (1911), No. 3, pp. 69–71; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 534, 535*).—This article gives analyses and discusses the fertilizing value of leached wood ashes obtained as residues from the preparation of potash. It is shown that these residues sometimes contain as high as 1 per cent of potash, 1½ per cent of phosphoric acid, and a relatively large percentage (over 20 per cent) of lime. They are, therefore, of considerable fertilizing value, particularly on soils benefited by lime.

The best method of applying lime to arable land, R. P. WRIGHT (*West of Scotland Agr. Col. Bul. 55, pp. 197–216; abs. in Mark Lane Express, 105 (1911), No. 4146, p. 345*).—In comparative tests of different rates and times of application of burnt lime and of the use of gas lime on cereals, fruit crops, and hay, it was found that in the case of medium and light soils large applications of not less than 4 tons per acre at long intervals of time were much less effective than the same amount of lime applied in divided applications at shorter intervals. Gas lime applied at the rate of 4 tons per acre for turnips produced a much smaller increase than an equal amount of burnt lime, but in the 7 succeeding years of rotation its action was much more beneficial to crops. "In that period it gave a total increase of more than 3 times the value of that produced by burnt lime, and on account of its low cost and its efficacy it gave much more profitable returns than any other lime dressing used in the experiment."

Relative economy of ground and slaked limes, R. P. WRIGHT (*West of Scotland Agr. Col. Bul. 55, pp. 219–221; abs. in Mark Lane Express, 105 (1911), No. 4146, pp. 217–221*).—The general conclusion from the experiments here briefly reported is that properly slaked lime can be as uniformly and completely distributed as ground lime and is more effective.

Lime for agricultural purposes, A. J. PATTEN and J. A. JEFFERY (*Mich. Sta. Circ. 11, pp. 79–82*).—This is a brief popular compilation of information on this subject.

Experiments with sodium chlorid as a fertilizer for sugar beets, F. STROHMER and O. FALLADA (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 40 (1911), No. 3, pp. 425–441*).—The experiments here reported dealt particularly with the use of a mixture of ammonium sulphate and sodium chlorid as a substitute for sodium nitrate, and showed that such a mixture is fully as effective as regards yield and sugar content of beets as nitrate of soda, and that the sodium base left in the soil by the sodium chlorid fertilizer does not behave differently from that resulting from the assimilation of sodium nitrate The results therefore indicate that the sodium-chlorid-ammonium-sulphate mixture may profitably replace sodium nitrate under certain conditions

The article contains a short bibliography of the literature bearing upon the subject.

The influence of molasses on soil fertility (*Agr. News [Barbados], 9 (1910), No. 222, p. 339; 10 (1911), No. 238, p. 179; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 1910, No. 2, pp. 230, 231*) —This article briefly summarizes the results of experiments in Mauritius (E. S. R., 21, p. 724), Antigua, and Hawaii (E. S. R, 24, p. 224), with molasses as a fertilizer for sugar cane, indicating "that the application of molasses to fallow land, or to land in which sugar cane is to be planted after several weeks have elapsed, may have a beneficial effect in stimulating the action of the nitrogen-fixing organisms and thus adding to the store of nitrogen for the crop that will be growing after such a time has elapsed as will have allowed this stimulus to have had its proper effect."

The beneficial effect observed may also be due in part to the relatively large percentage of potash present in the molasses.

It was shown in the Hawaiian experiments "that molasses applied at intervals to growing canes which have received artificial manure is likely to do harm, either by destroying nitrates that have been already applied or by preventing nitrates from being formed from other compounds containing nitrogen, in the manure."

In the Antigua experiments the application of 400 gal. of molasses per acre increased the yield of cane 1.2 tons per acre. The application of 200 gal. of molasses per acre did not increase the yield.

The agricultural utilization of certain waste products, T. GRIFFET (*Jour. Agr. Prat., n. ser., 22 (1911), No. 33, pp. 200–202; Engrais, 26 (1911), No. 34, pp. 943–945*).—This article gives the principal fertilizing constituents and discusses the price of various animal and vegetable waste products such as meat, bones, hair, wool, poultry manure, poudrette, peanut oil cake, silkworm chrysalids, sardine waste, tobacco waste and ash, calcium carbid waste, and wastes from wine, sugar, and oil making.

Commercial fertilizers, M. A. SCOVELL and H. E. CURTIS (*Kentucky Sta. Bul. 152, pp. 195–322*).—This bulletin reports the analyses and valuations of 555 brands of fertilizers inspected by the station during the year 1910.

Fertilizer inspection (*Maine Sta. Off. Insp. 33, pp. 77–108*).—This circular reports the analyses of samples of fertilizers found on sale in Maine in 1911 with notes on the requirements of the state law and the nature and use of fertilizers.

AGRICULTURAL BOTANY.

Studies on fruit respiration, H. C. GORE (*U. S. Dept. Agr., Bur. Chem. Bul. 142, pp. 40, figs. 3, dgms. 14*).—This bulletin gives the results of experiments on the effect of temperature on the respiration of fruits, the effect of picking on the rate of evolution of carbon dioxid by peaches, and the rate of accumulation of heat in the respiration of fruits under adiabatic conditions. An absorption apparatus and a constant temperature incubator suitable for use in the study of the respiration of fruits are described.

Measurements are given of the rate of respiration at different temperatures of many fruits, such as berries, peaches, apples, grapes, etc. The respiration intensity of these fruits varied greatly, but when the data were platted similarly shaped curves were formed.

No correlation between composition or size and respiratory activity appeared. In general, however, fruits which grow and mature quickly and soon become overripe respire rapidly. This is true of most small fruits. On the other hand, fruits with a long growing period and maturing slowly, such as the citrus fruits, are very inactive physiologically. Peaches, plums, apples, pears, and grapes are intermediate in this respect.

The rate of respiration was found to increase from 1.89 to 3.01 times, an average of 2.376 times for each 10° rise in temperature for 49 sets of determinations with 40 different kinds of fruits. No stimulus in the rate of respiration due to picking was detected.

On the respiration of different floral organs, Mme. G. MAIGE (*Ann. Sci. Nat. Bot., 9. ser., 14 (1911), No. 1–3, pp. 1–62*).—The results are given of experiments with a large number of plants on the respiration of the sepals, petals, stamens, and pistils compared with each other and with the leaves, and of variations in the respiration due to the age of the floral whorls.

It was found in general that the intensity of the respiration in the floral organs is greater than that of the leaf. Of the floral organs the pistil respires the most actively. In the case of the stamens, the anthers present a respiratory intensity greater than the filament, which itself gives off more carbon dioxid than the leaves. The calyx was found to possess an active respiration considerably greater than that of the corolla, which equals or is less than that of the essential organs.

The intensity of respiration in proportion to the fresh weight of the floral organs decreases with age except in the case of the pistils, which often show increased respiration as long as they continue to develop. The intensity of respiration of the floral organs in respect to their age increases for each of the parts of the flower except the stamens, in which there is a falling off corresponding to the maturity of the pollen grain.

The respiratory quotient of the floral organs was found to be greater than that of the leaves, and the pistil greater than that of the stamens.

The reproductive fronds of the vascular cryptogams were found to have greater respiration than the vegetative ones.

The influence of air currents on transpiration, Maud A. Brown (*Proc. Iowa Acad. Sci., 17 (1910), pp. 13–15*).—This is a brief preliminary report on experiments to show the influence of air currents on the transpiration of Clivea and one of the Amaryllidaceæ. The results show that in every case of plants exposed to the strongest current a checking of transpiration occurred, while gentler currents stimulated transpiration.

The action of the osmotic pressure of the nutrient media on the form and structure of plants, J. Beauverie (*Rev. Gén. Bot., 23 (1911), No. 269, pp. 212–219, figs. 8*).—The author gives the results of experiments on growing Aspergillus, Phaseolus, Pisum, Lupinus, Zea, and Triticum in various concentrations, with special reference to the modification in structure induced by the osmotic pressure of the nutrient media in which the plants were grown.

Amyloclastic secretory capacities of the embryo and aleurone layer of Hordeum, I, F. Stoward (*Ann. Bot.* [*London*], *25 (1911), No. 99, pp. 799–841*).—This is a study of the digestion and ultimate depletion of the storage-reserve materials of the endosperms of cereal seeds during the progress of germination, with special reference to the question of the vitality and auto-depletion of the endosperm. The phases investigated include the amyloclastic secretory capacity of the embryo and of the aleurone layer of barley and the relative amyloclastic secretory and self-depletive capacity of the endosperm and inner endosperm.

It is claimed that the experiments here reported prove that both the embryo and the aleurone layer possess an amyloclastic secretory capacity, but that the magnitude of the aleurone layer capacity is much the greater. The endosperm, by virtue of the secretory functions of the aleurone layer, was found to be capable of true auto-depletion.

On the penetration of salts into the protoplasm and the nature of their toxic action, J. de Rufz de Lavison (*Ann. Sci. Nat. Bot., 9. ser., 14 (1911), No. 1–3, pp. 97–189, fig. 1, dgms. 6*).—This is a more extended investigation of this subject than has been heretofore given by the author (E. S. R., 24, p. 532). It includes discussions on the general properties of colloids and of protoplasm, and on the general properties of salts in regard to their possible mode of action on the protoplasm together with the results of experiments on the penetration of salts into the protoplasm, and the action on and toxicity produced by these salts.

It was found that for weak solutions, cations of alkalis and alkaline earths combined with a nontoxic anion easily penetrated the protoplasm. The salts of barium, of cæsium, and of iodin penetrated the protoplasm with difficulty. Certain salts of aluminum and yttrium and a large majority of the salts of the heavy metals do not penetrate the living protoplasm. Contrary to current opinions, the author found that the permeability of the protoplasm to weak solutions is an absolutely different phenomenon to its permeability by strong solutions. The protoplasm under the influence of strong solutions becomes completely permeable, without, however, being killed by those salts which in weak solutions are unable to penetrate it. Protoplasm considered in its entirety as a membrane is then a modifiable membrane.

The author claims to have established 2 facts as to the toxicity of the salts: (1) The toxic action of a molecule is approximately a property of acid and basic radicals for a large number of salts, while this is due to properties acquired by the molecule by reason of its nonsaturation by the acids and bases; (2) the toxic salts are those which do not penetrate at all or only with difficulty the living protoplasm when they are employed in weak solutions, while solutions of nontoxic salts, on the contrary, easily penetrate the protoplasm. As to the nature of protoplasm it seems to be a very unstable substance as regards a large number of salts.

On the mineral nutrition of vascular plants based on the root structures, J. DE RUFZ DE LAVISON (*Rev. Gén. Bot., 23 (1911), No. 269, pp. 177–211, figs. 2*).—In a further investigation on this subject (see above) the author holds in addition to the facts previously noted that the endodermis of roots acts as a sort of filtration medium for the salts able to penetrate the protoplasm, the intensity of this filtration power depending upon the nature of the plants, the kind of salt, and the age of the protoplasm of the endodermis.

The rôle of manganese in plant nutrition, P. LEIDREITER (*Studien über das Verhalten des Mangans im Boden zu einigen landwirtschaftlichen Kulturpflanzen (Hafer), Pferdebohne, Senf, Kartoffeln, Zucker- und Runkelrüben. Inaug. Diss., Rostock, 1910, pp. 70; abs. in Ernähr. Pflanze, 7 (1911), No. 6, p. 53, fig. 1; Rev. Sci. [Paris], 49 (1911), I, No. 17, p. 536; Zentbl. Agr. Chem., 40 (1911), No. 8, pp. 531–535*).—Compounds of manganese have increased the yield of oats, mustard, beets, and potatoes. The green color was especially accentuated in the case of oats and beans, and the action of manganese manifested itself about the fifth week of growth. Beans were found to assimilate the largest doses of manganese, though an excess was easily shown to be injurious to them. Twenty-five mg. of manganese per liter of the nutritive solution was injurious to oats, and a solution of 0.5 gm. of manganese per liter killed oats after 2 months. Oats tolerated a greater proportion of manganese when grown in the soil than when grown in nutritive solutions. The addition of manganese to soils increased the sugar content of beets and the starch content of potatoes.

The action of manganese showed itself best on humus soils, to a less extent on clay soils, and least on sandy soils. It was found that the phosphate or nitrate of manganese was able to become a source of phosphoric acid or of nitrogen, the nitrate being absorbed most readily. Young plants were much richer in manganese than mature ones, while the leaves were the richest and the stems the poorest in manganese compounds.

A theory regarding the manganese soils and pineapples, C. C. JAMES (*Hawaii. Forester and Agr., 8 (1911), No. 6, pp. 176–178*).—In a brief discussion of the manganese soils of Hawaii, the mineral content of pineapples and sugar cane, and the various manganic compounds, the author assumes that the toxic action of these manganese soils on pineapples is due to the action of calcium manganite primarily and to the secondary action of other salts and acids upon the calcium manganite.

The phosphorus assimilation of Aspergillus niger, A. W. DOX (*Abs. in Science, n. ser., 34 (1911), No. 868, p. 218*).—The author reports that a number of phosphorus compounds were readily utilized by this organism in culture media.

On the histological relations between Cuscuta and its host, MARY G. THODAY (SYKES) (*Ann. Bot. [London], 25 (1911), No. 99, pp. 655–682, pls. 3*).—This is a study of the origin of the protoplasmic connecting threads in plant tissues, in which by a careful histological investigation of the haustoria of

Cuscuta it is attempted to determine whether sieve plates are ever formed in compound walls separating the cells of the host from those of the parasite. After a brief discussion of the histology of Salvia and of Cuscuta, the author gives the results of her investigations on the relations that exist between host and parasite. The hosts examined were *Salvia* sp. (perennial) and *Vitis* sp., and the parasite *C. reflexa.*

It was found that the development of the sieve plates and sieve fields in the phloem of Salvia and Cuscuta agreed in all essentials with those of Vitis and Laminaria. The invading haustorium of Cuscuta was found to consist of a brush-like group of hyphæ, the central ones of which push into the pith or fuse with the xylem of the host; the ones next surrounding these fuse with the sieve tubes, while the peripheral hyphæ of the brush remain in the cortex. The main mass of the originally separate hyphæ form in the mature haustorium, by lateral fusion with one another, a compact tissue. Each hypha composing the tissue becomes subdivided into a number of cells forming a strand. When the tip of the hypha is connected with a sieve tube of the host, this strand of cells develops into a strand of short sieve tubes. Connecting threads and sieve tubes are numerous in the subdivision walls, but are never found in the fusion walls between the originally separated hyphæ.

Preparatory to the formation of a junction with a host sieve tube an invading hypha lays itself alongside the sieve-tube wall, so that the two come into lateral contact The mucilaginous wall of the parasite where it touches a sieve area is then absorbed, and the naked protoplasm of the hypha applies itself to the sieve area of the host. The junction sieve plates and sieve fields in all cases exactly resemble those of the host under normal conditions. The translocation of food substances from host to parasite appears to be in the nature of a passive filtration. This arrangement probably disturbs as little as possible the normal mechanics of the sieve tubes of the host, and insures for the parasite a long-continued supply of food.

The influence of low temperatures on the distribution of the giant cactus, F. SHREVE (*Plant World, 14 (1911), No. 6, pp. 136–146, figs. 3*).—From a study of the effect of freezing on the giant cactus the author comes to the conclusion that the occurrence of a single day without midday thawing, coupled with a cloudiness that would prevent the internal temperature of the cactus from going above that of the air, would result in the destruction of this species A study of the climatological records and the known facts of its distribution seem to confirm this explanation of the limitation of its northern distribution.

Climatic selection in a hybrid progeny, D. T. MACDOUGAL (*Plant World, 14 (1911), No. 6, pp. 129–131, fig. 1*).—A report is given on observations made on a number of acorns of *Quercus heterophylla,* a species believed to be a hybrid between the willow oak (*Q. phellos*) and the red oak (*Q. rubra*).

A number of these seedlings, which were obtained on Long Island, were transferred to the Desert Laboratory at Tucson, Ariz. The entire lot cast their leaves and were dormant on December 10, 1907. In 1909 the only plants which had survived were 5 of the narrower-leaved types, and in 1910 all had perished.

The observations seem to indicate that the qualities of the red oak were least favorable to endure the desiccating action of the desert climate. It was endured longer by the narrower and more indurated leaves resembling those of the willow oak.

FIELD CROPS.

[Field crops at the Kabete Experiment Farm, 1909–10], J. Johnston (*Dept. Agr. Brit. East Africa Ann. Rpt. 1909–10, pp. 119–143*).—Meteorological data for 1909 and part of 1908 and 1910 are followed by numerous tables reporting the yields obtained in variety tests of numerous crops.

In experiments with Rose Coco beans it was noted that the variety with purple and black marked seed tended to suffer more from rust than the true type with rose-colored seed. An itemized statement is given for the cost per acre of maize grown in British East Africa.

In 2 year's tests of 8 different fertilizers and fertilizer mixtures for maize, the highest yield followed the use of 100 lbs. of sulphate of ammonia, while the application of 200 lbs. of kainit produced little observable effect.

In a test of 12 different fertilizers and fertilizer mixtures for wheat, the highest yield followed the application of 200 lbs. of superphosphate, this yield being even greater than that which followed the application of 400 lbs. of superphosphate. Similarly the use of 200 lbs. of basic slag was followed by higher yields than the use of 400 lbs. of the same material.

Annual report of the Lyallpur Agricultural Station for the kharif and rabi seasons, 1909–10, S. Milligan and D. Milne (*Ann. Rpt. Lyallpur Agr. Sta., 1909–10, pp. 12+XL*).—Although the use of soluble nitrogenous manures gave an increased yield of cane, this was entirely counterbalanced by a reduced percentage of raw sugar.

Ridge and flat plantings of cotton were followed by yields of 7.2 and 6.28 maunds (about 591.8 and 515.19 lbs.) per acre respectively, while subsoiling and ordinary deep plowing were followed by approximately equal yields. A test of the water requirements of American and Desi cottons showed that the former required 2 more waterings than the latter.

Deep cultivation and subsoiling were followed by approximately equal yields of wheat. A table states the results of a test of 20 varieties and strains of wheat. Applications of 112, 168, and 184 lbs. of calcium nitrate per acre were apparently followed by advances of 2¾, 2, and 4½ maunds respectively in yield of wheat per acre, but the residual value of the application was not ascertained.

Experimental work at Longerenong Agricultural College, J. T. Pridham (*Jour. Dept. Agr. Victoria, 9 (1911), No. 3, pp. 151–155, figs. 3*).—A brief report is given of the results of work with 4 generations of wheat resulting from 19 crosses which gave on the average a satisfactory percentage of grain. A variety test of oats is also reported.

Emergency forage crops, D. A. Brodie (*U. S. Dept. Agr., Office Sec. Circ. 36, pp. 4*).—This circular was issued July 7 in view of the reports of drought from the Central West. It gives directions for planting "quick growing crops that may be used as substitutes for the regular hay and pasture crops." Citations are given to other publications of this Department.

Forage crops for the sand-hill section of Nebraska, H. N. Vinall (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 80, pp. 23, figs. 7*).—Suggestions and directions are given for growing alfalfa, clovers, and grasses in the sand-hill section of Nebraska, in view of the recent influx of settlers into this region.

Results of the cooperative demonstration work in the dry farming districts along the Santa Fé lines in New Mexico, J. D. Tinsley (*Santa Fé Agr. Bul. 1, 1910, pp. 31, figs. 7*).—This is the first of a series of bulletins to report the results of cooperative demonstration work conducted under the auspices of the Santa Fé Railway Company. Notes are given on the soil and climatic conditions of the region and on the crops. Samples of 32 varieties of corn were distributed but very few good ears were matured, although a few varieties when favorably situated ripened nubbins. Nearly all the corn which matured was from native-grown seed of the Mexican June variety.

Leguminous crops for Hawaii, F. G. KRAUSS (*Hawaii Sta. Bul. 23, pp. 30, pls. 8*).—This bulletin gives directions for growing alfalfa, cowpeas, jack beans, pigeon peas, soy beans, and velvet beans in Hawaii. The results of experiments with some of these legumes are stated.

The author outlines methods for preventing cutworms from injuring alfalfa and states that seeding should be done in the fall months on account of the prevalence of cutworms. Experimental sowing with drills 12 to 24 in. apart used about 5 lbs. of seed per acre and even then thinning proved advantageous. Sowing with drills insures a more uniform stand, facilitates weeding, and if the rows are 20 to 30 in. apart renders horse cultivation for moisture conservation economical. Three varieties planted 5 ft. apart completely covered the intervening ground within 7 months of date of sowing and gave a green fodder yield of from 3 to 3½ lbs. per running foot at the first cutting and from 1 to 1½ lbs. per running foot of green fodder at subsequent harvests 30 days apart. These yields are somewhat less than those secured when rows were only half as far apart but greater than resulted from broadcast seeding. Greater yields per acre may apparently be obtained from row planting with proper cultivation and an optimum amount of water than from broadcasting with unlimited irrigation, and the relative cost of production by the 2 methods will depend on local conditions and the relative cost of water and labor. The irrigation methods in use are described

Ten standard cowpea varieties and several hybrids have been tested for from 1 to 4 years, a spring and a fall crop being usually grown each year. Descriptions are given in order of merit of some of the varieties, including Whippoorwill (No. 215), Iron (No. 274), Clay (No. 213) and Giant (No. 217). *Dolichos sesquipedalis* (No. 257), which closely resembles the cowpea, is also described

The author describes the habit of growth of the pigeon pea and outlines a method of pruning during the first and second year's growth which results in bushy, heavy-yielding plants. Two crops were harvested during the succeeding 12 months. The plants produced at the rate of more than 2 tons of seed per acre during the first year and almost twice that amount during the second, the calculation being based on rows planted 10 ft. apart. It is being used by the horticultural department as shelter for young seedling citrus stock and a temporary wind-break for certain other crops. Few insect pests attack it.

Experimental plantings of soy beans produced from 600 to 1,000 lbs. seed per acre in case of dwarf early maturing varieties and about twice as much in case of medium late and medium tall varieties. The fodder yields of heavy seeding ran about equal to or slightly above the seed yields. At Kualapuu the velvet bean matured in about 165 days. At the station grounds experimental plantings gave uniformly good yields. In a growing season of 200 days the Lyon bean (No. 225) yielded at the rate of 3½ tons of seed and 17 tons of green forage per acre. The Florida bean (No. 226) yielded at the rate of over 6 tons of seed and almost 12 tons of green matter per acre.

An appendix reports the chemical composition and the fertilizing constituents per 1,000 lbs. of fresh material for Hawaiian-grown legumes of the kinds dealt with in this bulletin.

Grass culture, T. B. HUTCHESON (*Virginia Sta. Bul. 193, pp. 3-23, figs. 11*).—Discussions of hay farming and soil fertility, hay buying in Virginia, the importance of pure seed, and the germination test are followed by recommendations of hay and pasture mixtures for various soils.

Orchard grass and clover mixed averaged 2,460 lbs. per acre in yield of hay during 1908 and 1909 as compared with 1,575 lbs. from orchard grass alone. Timothy, redtop, and clover mixed yielded 5,440 lbs. as compared with 4,460 lbs. of timothy and redtop, 3,307 lbs. of redtop alone, and 3,857 lbs. of timothy alone. In 1909 spring and August seedlings yielded 1.86 and 2.1 tons per acre respectively of a mixture of sapling clover, timothy, and redtop.

An application of 1 ton of burnt lime and 300 lbs. nitrate of soda per acre was followed by an average hay yield of 4,402.5 lbs. per acre during 1909 and 1910 at Appomattox. Applications of 300 lbs. nitrate of soda and 1 ton of burnt lime produced yields of 3,127 lbs. and 3,699 lbs. respectively as compared with 2,215.5 lbs. per acre on the check plat. The same applications at Bowling Green during 1910 alone were followed by yields of 3,375, 3,160, 2,055, and 1,950 lbs. of hay per acre respectively.

In a test at Appomattox of the residual effect of fertilizers applied to tobacco during 1907 and 1908, applications of (1) 700 lbs. acid phosphate and 400 lbs. nitrate of soda, and (2) 400 lbs. bone meal were followed by the highest average hay yields during 1909 and 1910 from 8 different combinations of acid phosphate, sulphate of potash, nitrate of soda, and a 3 : 8 : 3 fertilizer. At Bowling Green 1,500 lbs. of cotton-seed meal applied to tobacco in 1908 was followed by a hay yield of 2,400 lbs. per acre in 1910 as compared with 1,200 lbs. after an application of 500 lbs. of a 3 : 8 : 3 fertilizer and an average yield of 1,040 lbs. on unfertilized plats. The author believes that potash applications to grass land do not pay except perhaps on sandy soils from which plant food leaches rapidly. Nitrate of soda was found to have little residual effect after 2 years.

Applications of (1) 100 lbs. of muriate of potash and 150 lbs. of dried blood and (2) 100 lbs. muriate of potash, 200 lbs. acid phosphate, and 150 lbs. dried blood were followed by yields of 3.12 and 3.18 tons of cured hay per acre at Blacksburg in 1909. In 1910, however, the highest yield followed an application of 200 lbs. of 16 per cent acid phosphate. Slightly increased yields also followed applications of 1 ton of burnt lime and 100 lbs. nitrate of soda per acre.

At the end of the third year after seeding a plat which produced a little over 1 ton per acre was plowed and reseeded without fertilizer. The next year it yielded 2½ tons and the following year only 2 tons, indicating that timothy and clover deteriorate after the second year on this soil.

Grasses, A. M. Ten Eyck (*Kansas Sta. Bul. 175, pp. 291–394, figs. 40*).—Directions are given for growing, harvesting, and utilizing grasses adapted to Kansas conditions and experiments along these lines are reported.

During the 4 years 1905–1908 common alfalfa and Turkestan alfalfa excelled the other hay crops with yields of 8,426 and 6,875 lbs. of hay per acre respectively. *Bromus inermis* and alfalfa mixed yielded 6,576 lbs. and timothy alone yielded 5,528 lbs. It was noticed that the yields of *B. inermis* and meadow fescue decreased each year after the first crop was cut. Orchard grass was less uniform in this respect.

During 1905 determinations of moisture in samples of various hays at stacking were made and are presented in tabular form. Figures for the years 1905–1908 and 1909 show that the moisture content of the same kind of hay may range from 13.95 to 31.45 per cent or even more widely in different years. Hay stored before it is fully cured "may readily lose 15 to 20 per cent in weight after being put into the mow or stack, due to loss of moisture alone." In 1909 the average moisture content of the 4 cuttings of alfalfa when stacked was 29 per cent. Green alfalfa shows about 80 per cent of moisture at the first cutting and 70 per cent at the second cutting. A table summarizes experiments in breaking and cropping prairie sod and reports the yields secured of flax, spring wheat, oats, corn, and other crops.

Winter cereals without irrigation, H. G. MUNDY (*Rhodesia Agr. Jour., 8 (1911), No. 4, pp. 584–591*).—A discussion of the relation of winter cereals to dry farming is followed by a summary of the results obtained from experiments in Rhodesia.

The protein content of barley kernels, E. SPERLING (*Landw. Umschau, 1910, pp. 213–215; abs. in Jour. Landw., 58 (1910), No. 2, p. 135*).—In 1907 strains of varying protein content were selected for sowing in 1908, when these variations in protein content appeared to be inherited. In 1909 such inheritance was not observed, the samples selected for high protein content being lower in this respect than those selected for low protein content.

Inheritance in maize, E. M. EAST and H. K. HAYES (*Connecticut State Sta. Bul. 167, pp. 5–142, pls. 25*).—This bulletin is strictly technical in character, reporting investigations carried on since 1906 at the Connecticut State Station and since the fall of 1909 at the Bussey Institution.

Earlier work on inheritance in maize and the ability of the corn plant to lend itself to individual analysis by the study of simple characters in carefully controlled pedigree cultures are discussed. The origin of the corn plant is considered and a description is given of the essential characters of each of the different subtypes. The principal object of the work is to determine whether the different characters under observation all obey the same law of heredity or whether separate principles are involved, and whether characters apparently inherited independently are not sometimes correlated with each other. The questions of the dominance of a character in the first generation of a cross and the purity of extracted homozygotes are also considered

A description is given of each of 29 strains used in the work and the methods followed are described in detail.

Among the endosperm characters starchiness was found to be dominant over nonstarchiness. Tabulated data show that in all cases the average number of dominants and the average number of recessives accord with the expected 3:1 ratio of the Mendelian hypothesis. The dominant homozygotes bred true to the character of starchiness. All of the extracted recessives proved true to nonstarchiness except from the progeny of 1 ear which was nearly so. Taking the starchy and nonstarchy crosses as a whole, the authors consider that the mechanism by which the members of this allelomorphic pair are distributed among the gametes is accurate.

The physical condition of starch behaves as a plant character affecting the whole ear. When crossing sugar varieties with starchy varieties it was found that starchiness was a separate plant character independent of the physical form in which it exists. Sugar varieties were found that were simply Dents and Flints which lacked starchiness.

The results from several crosses of Flint and Dent varieties show definitely that "the characters which give the Flint or Dent appearance to maize are transmitted to the entire ear and not as endosperm characters to the individual seed. They conform to the essential feature of Mendelism by showing segregation, and they are due to the action of more than one transmissible character" The proportion of corneous starch to soft starch depends partially upon size and shape of pericarp and upon the number of rows per ear.

Size characters such as number of rows per ear, height of plant, length of ear, and size of seed are complex in themselves as shown by the numerous varieties grown commercially and by the fact that they respond to environmental stimuli. "For these reasons we do not attempt to analyze our results further than to say that they do show segregation in every case. . . . Therefore we believe that size characters mendelize."

In some instances 2 yellow colors appeared in the endosperm each behaving when crossed with its absence as an independent allelomorphic pair. Both of these colors, although they behave in inheritance as separate entities, are either identical or very similar in composition. Data given show that in various crosses between varieties with white and yellow endosperm yellow was dominant and appeared as Xenia in the F_1 kernels. The F_2 kernels in their cross gave approximately the 3:1 (monohybrid) ratio. The F_3 kernels all showed the 3:1 ratio except one which showed the 15:1 (dihybrid) ratio. Dihybrid ratios were also secured in several other crosses. The F_2 seeds from the cross between a White Flour corn and a Yellow Dent made it evident that this combination was wholly monohybrid, having the 3:1 ratio. Among dihybrids the extracted dominants in the F_4 generations have in every case bred true.

The inheritance of the purple character was found to include also that of a hypostatic red color which appears in the crosses between the various purple and nonpurple families. The authors give exhaustive data on crosses between purple and nonpurple varieties. The results all tend to show, as they state, that the purple aleurone color behaves as a normal Mendelian character in inheritance. For example, in the cross between a White Flint and Black Mexican Sweet, the F_1 kernels formed in the hybrid seed were all purple. On growing these seeds 9 selfed ears were obtained, 7 of which proved to be monohybrid giving the 3:1 ratio, and 2 dihybrid giving a 9:7 ratio In the F_3 generation 1 of the above dihybrid ears was tested. Nineteen selfed ears were obtained 2 of which were pure purple, 10 monohybrid, and 7 dihybrid.

The authors formulate the following law in regard to Xenia: "When 2 races differ in a single visible endosperm character in which dominance is complete, Xenia occurs only when the dominant parent is the male; when they differ in a single endosperm character in which dominance is incomplete or in 2 characters both of which are necessary for the development of the visible difference, Xenia occurs when either is the male."

The authors find in their studies of various plant characters that the podded character of the podded maize is dominant and behaves as a simple Mendelian monohybrid. Work carried on with regard to the factors which influence the development of the various red sap colors appearing in the pericarp, the cob, the husks, the silks, the glumes, and the anthers shows that coupling sometimes occurred, but as a rule independent of the red in the other parts of the plant. Simple monohybrid results were obtained. Data given show that the red cob character is dominant to white cob and the red color in the silk to its absence.

Abnormalities are generally found to segregate but no further conclusions can yet be drawn on this point.

An extensive bibliography is appended.

Improvement in corn, H. K. Hayes and E. M. East (*Connecticut State Sta. Bul. 168, pp. 3-21, pls. 4, figs. 1*).—In this paper the authors discuss the disadvantages of the continued selection method of improving seed corn, and show that even with every precaution to prevent it selection tends toward inbreeding. Indian corn, as found in the field, consists of a number of types which have been brought together in the different plants by cross fertilization. Data are presented in tabular form which confirm this view and indicate that in nearly all cases the first generation of inbreeding has the greatest detrimental effect, and "that after a type has been inbred until it is in a pure state, continued inbreeding does not change its yielding ability." Inbreeding, therefore, has simply isolated the different types from the commercial variety.

Data given comparing crossed and selfed varieties with the parents show that the yield was increased in the first generation of the cross when the parents had been selfed for one or more years before the cross was made, and the increase in the first generation hybrid was found to be much larger than in the normal variety. Where the second generation crop was grown the yield was greatly reduced.

The results of a test of first generation hybrid corn, carried on in cooperation with several farmers in Connecticut, are given. Seven crosses between varieties were used and gave beneficial results in 5 cases, showing crops ranging from 7 to 44 bu. more for the hybrid than for the parent grown. The 2 crosses which proved no better than the parent varieties were also tested by the farmers who made them. A test of Watson White Flint X Woodbridge Yellow Flint gave a much larger yield for the crossed type than for Woodbridge parent, outyielding the parent by 17.2 bu.

The authors conclude that the production of corn by the utilization of the increased vigor due to a first generation hybrid is of commercial importance. Directions are given for the selection of parent varieties and for making the cross, and securing first generation hybrid seed every year for the commercial crop.

Experiments in potato growing, H. HENSHAW (*Jour. Bd. Agr.* [*London*], *17* (*1911*), *No. 11, pp. 892–904*).—These pages report the results of numerous tests of seed of various potato varieties direct from Scotland in comparison with other seed grown out of Scotland for from 1 to 5 years.

In 1905 the use of seed of sizes ranging from 1¼ to 2¼ in. resulted in crops varying directly in total weight with the size and weight of the sets planted, but more than twice as great a weight of diseased potatoes resulted from the planting of the largest sets. In 1906 and 1907 sets between 1¼ and 1¾ in. and those between 1¾ and 2¼ in. yielded crops averaging 11 tons and 12 tons 3 cwt. per acre respectively, but the weights of marketable produce yielded were practically equal. The author notes that the kidney-shaped varieties do not give such satisfactory results when cut as do the round varieties.

Potatoes which had sprouted badly and from which the sprouts were removed before planting, produced somewhat higher yields in 4 tests conducted in 3 different years than did sound unsprouted potatoes. Variety tests are also reported. Numerous varieties, each purchased as genuine stock, are grouped on the basis of their close resemblance to 8 well-established varieties.

Standard and undesirable commercial types of potatoes, J. G. MILWARD (*Wisconsin Sta. Circ. Inform. 26, folio; Sup.*).—This circular is published in the form of a wall poster about 33 in. by 21 in., and is designed to bring about improvement in the uniformity and quality of car shipments, especially in connection with the use of the community center plan of seed distribution. It illustrates the standard types of Burbank, Early Rose, and Rural New Yorker potatoes and some undesirable types of each. It is accompanied by a supplement which illustrates 4 stardard late varieties and the same number of standard early varieties.

Growing pedigreed sugar beet seed in South Dakota, 1910, J. H. SHEPARD (*South Dakota Sta. Bul. 129, pp. 147–160*).—This is a continuation of Bulletin 121 (E. S. R., 23, p. 536).

A brief account is given of a plan for classifying the beets with reference to size, sugar content, and other characteristics. Notes on the work of 1910 are accompanied by tables presenting data on the mother beets, hybrid mothers, perennial mother beets, and the seed grown during that year.

How to grow wheat in Kansas, W. M. Jardine and L. E. Call (*Kansas Sta. Bul. 176, pp. 3–28, figs. 4*).—Experiments in 1910 testing 11 different methods of preparing a seed bed for wheat are summarized as follows:

Methods of preparing a seed bed for wheat.

Method of preparation.	Yield per acre.	Cost per acre for preparation.	Value of crop at 80 cts. per bushel.	Value of crop less cost of preparation.
	Bu.			
Disked, not plowed	4.29	$1.95	$3.42	$1.47
Plowed September 15, 3 in. deep	14.46	3.05	11.57	8.52
Plowed September 15, 7 in. deep	15.79	3.55	12.63	9.08
Double disked July 15; plowed September 15, 7 in. deep	23.57	4.35	18.85	14.50
Plowed August 15, 7 in. deep. Not worked until September 15.	23.62	3.55	18.89	15.34
Plowed August 15, 7 in. deep	27.74	3.90	22.19	18.29
Double disked July 15; plowed August 15, 7 in. deep	32.68	4.70	26.14	21.44
Plowed July 15, 3 in. deep	33.46	4.45	26.77	22.32
Listed July 15, 5 in. deep. Ridges split August 15	34.35	3.75	27.48	23.73
Listed July 15, 5 in. deep. Worked down	35.07	2 70	28.05	24.35
Plowed July 15, 7 in. deep	38.30	4.95	30.69	25.74

The author discusses the value of the summer fallow to the dry-land farmer in western Kansas and considers briefly the 5 years' results comparing summer fallowing with continuous cropping as already reported (E. S. R., 24, p. 723). The author favors spring plowing for summer fallowing. Variety tests show that the hard red winter sorts, to which class Turkey Red and Kharkof belong, are best adapted to Kansas conditions. In the eastern tier of counties where semihumid conditions prevail the soft red winter sorts, such as Zimmerman, Fultz, and Currell, seem best adapted.

Methods of cleaning the seed, treating for smuts, and controlling insects and weeds are discussed, as well as cultural methods and quality in wheat.

Progress of wheat investigations, C. Willis and W. L. Burlison (*South Dakota Sta. Bul. 128, pp. 123–144, figs. 5*).—Statistical data on the relative acreage and yields of wheat and corn in South Dakota during each year between 1900 and 1909 inclusive, are followed by directions for wheat production in South Dakota. From the work done it appears that Turkey Red is one of the best varieties to plant. A test of fanned and unfanned seed of 3 varieties resulted in an average advantage of 1.43 bu. per acre in yield obtained from the fanned seed. Red Fife averaged 18.3 bu. per acre from 1905–10, excelling 13 other spring wheats, but early Java averaged 18.5 for 1909–10. In a test of 26 varieties of durum wheat Arnautka averaged 23.2 bu. per acre during 1901–2 and 1904–10, being excelled only by Arnautka 1,590, Arnautka 1,530, and Taganro 1,570, which were tested during briefer periods. Descriptions of a number of varieties are followed by directions for treating seed for smut.

Garden and field seeds sold in Connecticut in 1910–11, Mary H. Jagger and E. H. Jenkins (*Connecticut State Sta. Rpt. 1909–10, pt. 12, pp. 805–818*).—Instructions for sampling seeds are followed by notes on the results of tests of alfalfa, clover, and grass seeds. A table shows in detail the results of each test made. The data presented includes the name of the dealer from whom seeds were secured, the weight per thousand seeds, the purity, germination, and viability percentages, and the percentage of inert matter and of foreign matter present.

Among 5 varieties of onions tested the minimum and maximum results were obtained from White Portugal and Wethersfield Red, of which 70.82 and 79.07 per cent respectively, sprouted. Of Connecticut and California grown seed stated to be less than 1 year old 74.72 and 88.18 per cent respectively, sprouted. In the case of seeds stated to be between 1 and 2 years old the percentages were 65.58 and 77.46 respectively, as compared with 21.9 and 57.34 in case of seed reported between 2 and 3 years old, and 59.5 and 10 per cent in case of seed reported as between 3 and 4 years old.

The average vitality found in tests of 11 varieties of Connecticut-grown sweet corn ranged from 45 to 96 per cent. Better care in drying and storage is advocated.

In germination tests of pepper seeds "a 10-minute treatment of the seed with ½ and 2 per cent formalin seems to have only slightly improved germination although it reduced considerably the number of moldy seed."

The application of the frequency polygon in plant breeding, E. Zaleski (*Abs. in Jour. Landw., 58 (1910), No. 2, p. 140*).—The author draws frequency curves and considers whether the more strongly marked deviations from the normal curves are due to unusual conditions of growth or to other disturbances. The polygons obtained from separate plats are united into summation polygons, and conclusions based upon the symmetry or the lack of symmetry of the resulting polygons are drawn.

HORTICULTURE.

Report of the horticulturist, C. F. Kinman (*Porto Rico Sta. Rpt. 1910, pp. 25–30, pls. 2*).—A brief progress report is presented on the station's work with temperate-climate and citrus fruits, mangoes, avocados, orchard cover crops, vegetables, and miscellaneous plants.

With the better understanding of cultural methods and the realization of the value of windbreaks, the quality of citrus fruits is improving considerably. Wild native oranges when picked in saleable condition sell readily along with the cultivated varieties. Much of the uncultivated citrus fruit has decayed in transit to New York. Experimental evidence indicates that in Porto Rico as in Florida and California (E. S. R., 20, p. 840) the main cause for decay is careless handling. In the cooperative fertilizer experiments with citrus fruits, the complete fertilizers continue to give the best results. Some experiments are being conducted to determine the influence of fertilizers on the production of out-of-season fruit which could be shipped either before or after the main crop has been shipped from California and Florida. In the variety tests with oranges, Hart Late has succeeded much better than any of the other varieties at the station. The trees of this variety, while bearing a heavy crop, remained vigorous during the long, severe drought of the winter and showed no detrimental effects from the excessive rains during the following summer. Rangpur limes which ripened in December, 1909, were left on the tree and were in good condition one year later.

In the orchard cover crop tests, plantings of a number of legumes were made. Of these *Canavalia gladiata* made the most rapid and vigorous growth, covering the ground in a few weeks after planting and smothering all grass and weeds. The plant continues its vigorous development until checked by the winter drought. Its extensive root system with its heavy top growth makes it valuable for lands injured by washing, though its vining habit is often troublesome in an orchard. The legumes are also being tested relative to their cropping value during the winter months.

The station now has 62 varieties of mangoes besides numerous seedling plants. Of the 6 varieties fruiting the past year, Sandersha was the most prolific, single trees bearing from 60 to 190 large fruits. Bulbulchasm and Cambodiana were considered the best in flavor. Many of the fruits of the latter variety, however, as well as a few of those of Sandersha were injured by fruit flies when allowed to ripen on the tree. Until a means has been devised for the control of this fly susceptible varieties of mangoes can not be recommended.

The Sandersha, Ameeri, and Cambodiana mangoes were used in experiments to test the time for picking, methods of packing, and keeping quality. Fruit representing 3 stages of ripeness was gathered and stored in rooms of different temperatures. In a room with a temperature ranging from 80 to 83° F., a fungus disease injured many of the Ameeri and Sandersha fruits, they having probably been infected in the field. This disease did not affect the fruits of Cambodiana or other varieties stored in a room with a temperature ranging from 42 to 48° F. Fruits almost ripe when picked softened within a few days in the warm room, the softening in the cold room being very much slower. Fruits picked while still solid, but mature, ripened in from 10 days to 2 weeks in the warm room, whereas they remained unchanged in the cold room for 60 days so far as could be observed. Fruits wrapped in oiled paper ripen more slowly and those infected with disease did not decay so rapidly in the cold room.

Owing to unfavorable soil conditions, trouble is still being experienced in bringing avocados to maturity in the station orchard, although within a short distance from the station in more open soils avocados flourish and produce excellent fruits. An attempt to domesticate such temperate-climate fruits as pears, peaches, plums, apples, and persimmons is not proving highly successful. Cultural and variety tests with vegetables were continued during the year. Good results were obtained in the experiments with yams and malangas and when a heavy application of stable manure was made a few varieties of melons in the fertilizer experiments did well.

Imported types of *Carica papaya*, including a superior type from Hawaii, fruited during the year but the fruit was seriously damaged by flies and other insects. The plantings of eucalypts, which are confined almost entirely to the flat, poorly drained soils, are showing considerable difference in thriftiness, *Eucalyptus piperita* and *E. robusta* having made the best growth. The latter trees 2 years from planting are 29 ft. tall. All of the varieties make a much slower growth in the absence of good drainage.

Frames as a factor in truck growing, W. R. BEATTIE (*U. S. Dept. Agr., Farmers' Bul. 460, pp. 29, figs. 12*).—This is a popular treatise on the utilization of frames for growing vegetables out of season. The author calls attention to the increased use of frames in the South Atlantic Coast States and discusses types of frames and their construction, soil and fertilizers, watering crops in frames, temperature, ventilation and protection, methods of handling a number of specific crops in frames, prevention and control of diseases and insects, and marketing frame-grown crops.

Fruit bud formation; progress of investigations in 1908, 1909, and 1910, B. S. PICKETT (*New Hampshire Sta. Bul. 153, pp. 36, pls. 2, figs. 6*).—The investigation here reported deals with the question of fruit bud formation as influenced by the factors of cultivation, fertilization, and cover cropping.

The experiment was conducted in an orchard of 302 trees, mostly Baldwins and about 25 years old at the beginning of the experiment. The soil conditions are quite uniform throughout the orchard and the ground almost perfectly level. The orchard was divided into 11 plats, including a sod plat and plats on which the trees were given the following treatment: Cultivation with cover crop the odd year, seeded the even year; cultivation and cover crop the even year, seeded the odd year; clean culture throughout the whole season; cultivation and cover crop annually; root pruning; a normal complete fertilizer; excess phosphorus; excess nitrogen; excess potash; and liming. The data given for the first two seasons consist of counts of the average number of apples per tree in all the plats. The data for 1910 shows the yield of each tree in the orchard plat by plat and some deductions are made relative to the influence of the various treatments on the formation of fruit buds at this stage of the investigation.

The results thus far indicate that clean cultivation up to July 10, followed by a cover crop of crimson clover, has given the greatest amount of fruit, although the plat on which cultivation and cover cropping was practiced 2 years in 3 gave almost as good results. In this orchard the inability of apple trees to produce fruit buds when grown in sod as compared with any of the systems of cultivation employed has been clearly and completely proved. Although the addition of fertilizers failed to stimulate a greater production of fruit buds, they improved the size and quality of the fruit. The largest quantity of No. 1 fruit per tree was produced in the limed plat, which plat included a section of the fertilized plats, and the next largest quantity of No. 1 fruit was produced in the plat receiving an excess of potash. The fewest No. 1 apples but the most highly colored fruit were produced by the sod plat. Excess phosphoric acid appeared to produce the smallest apples, though the fruit ran uniformly of good quality. The indications are that spraying has only an indirect influence on fruit bud formation. A general review of all results for 1910 indicates that a plentiful supply of moisture, the result of cultivation, was the most influential factor in stimulating the production of fruit buds. The addition of nitrogen in the form of a cover crop appears to be the second most important factor in this regard.

Variability of frost injury on fruit buds, Philfna F. Homer (*Mo. Weather Rev., 39 (1911), No. 4, pp. 599–601*).—A review is given of the known causes of the differences in frost injury, together with observations on the variations in the killing power of frost that have taken place in the past 5 years on the Timpanogos Fruit Farm, at Pleasant Grove, Utah.

Preliminary frost fighting studies in the Rogue River Valley, C. I. Lewis and F. R. Brown (*Oregon Sta. Bul. 110, pp. 62, figs. 19*).—Preliminary orchard heating tests conducted in the springs of 1909 and 1911 are reported, together with observations taken in the different orchards throughout the valley, including experiences of some of the growers. A brief statement is also given of conditions in the Willamette Valley.

The tests made in 1909 were largely negative, owing to an inferior grade of oil, lack of sufficient heaters, and unusual low temperatures. In 1911 two orchards, consisting of 6½ acres of 17-year-old pears and 2 acres of apples, were heated with 2 types of sheet-iron heaters, one of which was the open lard-pail type and the other contained a center draft. Two grades of oil were used, 28° distillate and 20° "slop" distillate.

Although the latter part of March was very warm, 6 frosts were recorded from April 12 to May 5, the lowest temperatures for each being 29, 27, 25½, 28, 26, and 31° F., respectively. At 30° outside temperature no increase was obtained with 20 heaters per acre. With 39 center-draft heaters per acre an average increase of 1° was obtained. One hundred of these heaters arranged 17 by 25 ft. increased the temperature 3½°, and when arranged 21 by 21 ft. increased the temperature 4.1°. The lard-pail type of heater, when used at the rate of 100 per acre, arranged 17 by 25 ft., gave an average increase of 4°. When a carbon arrester was placed on these heaters, however, the increase was only 1.3°.

The heavy fuel oil left an inch of residue after each firing which would not burn, and if left in the heater decreased the burning time. Oils with a paraffin base are to be preferred to those having an asphalt base. Oil is considered the best fuel, as less help is required and an even temperature may be maintained. The average cost per acre for a 4-hour-period is $5.10 for oil, not counting the equipment. Heaters cost about 20 cts. each.

Although orchard heating systems are by no means perfected, it is concluded that under the conditions experienced in the spring of 1911, there is absolutely no doubt but that a crop can be saved by orchard heating. The rows that were heated in the apple orchard have a crop and the farther away the trees were from the heated area, the less fruit was saved. The results with pears were less conclusive, d'Anjou pears showing a slight injury from a late frost. Winter Nelis pears did not set a good crop, although this appears to have been due to general unseasonable weather conditions rather than to the effect of frost or smudging.

Although the temperature as recorded at Corvallis in the Willamette Valley dropped below 29° on several nights and as low as 25° at one time and was below 28° for more than 2 hours, a fair crop of fruit is left, indicating that no arbitrary table of temperatures for frost injury has been worked out for all conditions.

Orchard heating, A. H. THIESSEN (*Mo. Weather Rev., 39 (1911), No. 5, pp. 761, 762*).—A short descriptive account of methods of frost fighting as carried on in the Grand Valley, Colo.

Protection against frost—frost candles, A. G. MCADIE (*Mo. Weather Rev., 39 (1911), No. 5, pp. 769, 770*).—A description is given of an inexpensive frost candle which has been devised recently at the San Francisco Weather Bureau office.

The frost candle, or cartridge, as it has been called, consists of a cardboard or stiff paper tube of suitable dimensions, filled with some combustible material, such as cotton waste and crude oil. A stopper is provided for the lower end and the projecting end of the cotton waste serves as a ready means of lighting. When used in an orchard the candle is suspended directly in the tree and about 6 in. beneath a metallic cover, which serves both to radiate the heat and to hold the soot particles that rise in the smoke. Cartridges have been made which burned for about 3 hours.

Winter vetch for a cover crop in Michigan orchards, H. J. EUSTACE (*Michigan Sta. Circ. 13, pp. 4, figs 5*).—This circular contains a popular discussion of the value of a cover crop in an orchard or vineyard, and gives brief directions for the culture of winter vetch, which plant the Michigan Station found to be especially valuable for the purpose.

Strawberry culture in Idaho, C. C. VINCENT (*Idaho Sta. Bul. 70, pp. 50, figs. 28*).—This bulletin contains a report on varieties of strawberries tested at the station for the past 3 years, considers the possibilities of strawberry culture in Idaho, discusses in detail the cultural methods employed by the leading growers of the State, and gives suggestions relative to systems of planting and subsequent treatment both in irrigated and nonirrigated regions.

Peach experiments 1906–1910, F. GARCÍA and J. E. MUNDELL (*New Mexico Sta. Bul. 76, pp. 42, figs. 10*).—To gain more reliable data on peach growing in New Mexico, the station started an experimental orchard in 1906. This bulletin embodies the results secured through the season of 1910, the second year of fruiting. The orchard site is described and a detailed account is given of the preparation of the land, planting operations, cultivation, irrigation, pruning, varieties planted, thinning, picking, packing, and yields.

The trees were planted 20 ft. apart each way and headed at about 12 in. from the ground. Low heading has been an advantage in thinning and picking the fruit and it appears also to have helped in retarding sun scald on the trunk and larger limbs of the tree. The flooding system of irrigation was practiced and the trees were irrigated during the winter also without as yet producing any noticeable injury. An examination of the root systems of the trees made during the fall of 1910 showed a large root development, practically all of which was between the second and fourth foot in depth of soil and spreading in all directions as far out as 15 ft. from the trunk.

Of the varieties tested Texas King has given the best results. Crothers is a fine late variety and a little surer than Elberta, which is apt to be injured by frost during the blooming period. The blooming and ripening seasons vary from year to year, depending on weather conditions. In 1909 late varieties bloomed about a week earlier and the fruit ripened a week later than in 1910. The blooming of earlier varieties in 1909 was retarded by a snowstorm. The ripening and shipping season of any one variety may vary from 10 to 15 days. Varieties which were not killed by frost yielded from 1 to 3 boxes in 1909 per tree and from 3 to over 5 boxes per tree in 1910. The actual net receipts after deducting all orchard operations from 4.82 acres of orchard in 1909 were $202.38 and $379.76 in 1910.

Experiments on the processing of persimmons to render them nonastringent, H. C. Gore (*U. S. Dept. Agr., Bur. Chem. Bul. 141, pp. 31, pls. 3, figs. 5*).—As noted in the introduction to the bulletin, by D. Fairchild, the experiments here reported are the outcome of the successful results secured by G. C. Roeding in 1905 and 1906 in the use of the Japanese method of processing persimmons in empty sake, or Japanese wine, casks (E. S. R., 17, p. 618). In view of these successful results experiments were conducted by the Bureau of Chemistry in cooperation with the Bureau of Plant Industry during the following 4 seasons.

The investigations from 1907 to 1909, the results of which are here summarized, consisted principally in attempts to improve the Japanese method. The use of the Japanese method was, however, but partly successful, even with the fruits which processed easily, because they often cracked as a result of the high humidity incident to the process and often softened unduly while in the casks or other containers employed.

During the season of 1910, an attempt was made to keep the fruit firm while being processed with vapors of alcohol by the use of some inert gas, such as carbon dioxid, the most readily available of these gases. These experiments, which are reported in detail, showed that if persimmons are kept in carbon dioxid for from 3 to 5 days during processing they become nonastringent and at the same time tend to remain firm, the lack of oxygen apparently retarding the life processes which result in softening. When carbon dioxid was used in the presence of alcohol vapors the rate of processing was at times more rapid than in carbon dioxid alone, but the fruits were less crisp and in 2 instances showed superficial injury. The absorption of moisture in the containers by well dried lump starch suggests the use of starch or some other absorbent as a means for preventing loss by cracking.

A number of varieties have processed successfully in carbon dioxid in from 3 to 5 days, but 2 lots of Japanese and the native persimmons (*Diospyros virginiana*) failed to do so. The rate of softening of persimmons was on the whole slightly but distinctly accelerated by processing. Overprocessing in carbon dioxid resulted in a large proportion of the persimmons becoming dark in color on softening subsequently. Processing persimmons in carbon dioxid after a cold storage interval of 27 days resulted in a rapid softening of the fruit after processing. Unsuccessful attempts were made to process the fruits by autoasphyxiation and by keeping them under water or other liquids. Chemical analyses of a number of varieties of persimmons have thus far shown no relation between the tannin content and ease of processing.

Although the present investigation is regarded only as preliminary, it is believed that the tentative results secured from the substitution of carbonic acid gas for the fumes of sake and the use of dry starch to prevent the cracking of the fruit during the processing should lead to the perfection and use of this method for the production of nonastringent persimmons which may be pared and eaten like an apple.

[Artificial ripening of dates] (*Arizona Sta. Bul. 66, pp. 403–456, pl. 1, figs. 6*).—After working with the date palm for a number of years and having brought under control for the most part the active enemies of the palm, the Arizona Station finds that the excessive waste due to insects, birds, and untimely wet weather remains a most serious drawback to the natural ripening of the fruit, as high as 90 per cent of the crop having been lost during unfavorable seasons. This, together with the almost complete failure of the Deglet Noor date, which is the standard of excellence in the Sahara, to mature and ripen naturally under Arizona conditions led to an attempt to devise a rational method of artificial ripening. Two processes of artificial ripening have been worked out, by the perfection and commercial adoption of which it is believed the loss of fruit will be almost wholly saved.

Chemistry and ripening of the date, by A. E. Vinson (pp. 403–435).—The author has continued his studies of date ripening and its economic application previously noted (E. S. R., 19 p. 22; 20, pp. 64, 659; 23, p. 641). The present report summarizes his investigations relative to date chemistry, including the phenomena of natural and artificial ripening and the development of a successful method of ripening dates through stimulation by chemicals at ordinary temperatures. Brief consideration is also given to the practical application of this method and its commercial importance. The results of more immediate practical application are summarized as follows:

"During the early period of its growth the date does not differ materially from other nonstarchy fruits in the percentage of dry matter it contains. After apparent maturity in size the rapid accumulation of sugar begins. This continues till the date begins ripening. It is thus desirable, even if artificial ripening is to be practiced, to leave the fruit on the tree as late as possible. If cut too early, the flesh about the seed must necessarily be thin and insipid.

"Some varieties of dates begin ripening when they contain not more than 55 or 60 per cent of dry matter. Their sugar content is not quite high enough to make them self-curing without further concentration of the juice. This does not occur in humid weather, and fermentation soon starts which further lowers the sugar content until the dates sour rapidly. Other varieties begin to ripen only after a much higher percentage of sugar is present and consequently are sugar cured before the protection of the living tissue of the unripe date is broken down by ripening. These differences determine souring and curing varieties.

"After dates have reached sufficient maturity they may be ripened artificially either by heat or by chemical stimulation. The naturally ripened dates have a delicate aroma which vanishes rapidly in the case of some varieties and persists for many days with others, notably Deglet Noor. This aroma is not developed by heat ripening. Many varieties ripen quickly after treatment with various chemicals, of which acetic acid is the best in most cases. They may be treated with the vapor of the strong acid or soaked a short time in vinegar. Those that ripen after this treatment develop the aroma of the naturally ripened fruit. Less responsive varieties, as Deglet Noor, yield readily to the vapor of nitrous ether, which is effective in exceedingly small amounts. It does not destroy the flavor and only slightly deepens the color.

"By the application of chemical methods of stimulating ripening, it will probably be possible to ripen inferior varieties, which deteriorate rapidly, at distant markets, and so to time the process that they may be delivered to the consumer in their best condition. This process may make possible the use of varieties which can be grown successfully under a wider range of climatic conditions than the Deglet Noor."

Ripening dates by incubation, by G. F. Freeman (pp. 437–456).—The incubation method of date ripening first experimented with by Vinson but laid aside by him for chemical processes (see above) was in 1910 independently developed, amplified, and economically tested by the author, who, by its means, ripened and marketed the first successful crop of Deglet Noor dates from the Tempe cooperative orchards. The details of the incubation method are here presented, together with the results of chemical studies conducted to throw more light on the conditions affecting the ripening of the dates and with a view to possible improvements in the commercial processes.

The author recognizes 2 types of dates suitable for ripening—those which have passed the full mature green stage and are just beginning to soften naturally into a perfectly ripe condition, and those which have also passed the full mature green stage but are beginning to dry down into a mummy state. The first class is most suitable for ripening by incubation and seems to give the best fruit when ripened at a temperature of 45 to 48° C. for a period of 3 or 4 days. Mummy dates must be soaked in water for 6 or 7 hours before the incubation process commences. The same conditions of moisture and temperature used in ripening Deglet Noor dates were also favorable for great activity of the inverting agents present in these dates, hence the artificially ripened product differs from that naturally ripened in having nearly all its sugar in the inverted form. Although soaking in tenth-normal ammonia strongly lessens the inversion and gives dates of good taste and quality, this treatment is not recommended owing to conflicting opinions as to the effect on human health. The flavor of the artificially ripened, invert Deglet Noor dates is sufficiently fine to have thus far been accepted by the trade at fancy prices. An important effect of the temperature upon the dates which are ripened by incubation is the destruction of insect eggs which with the naturally ripened product often cause a considerable percentage of wormy dates after they have reached the market.

In view of the station's date investigations as a whole and particularly in view of the successful results secured from the incubation process of ripening, the planting of Deglet Noor palms in the Salton Basin, along the lower Colorado and in southern Arizona up to an altitude of 1,200 ft. is definitely recommended.

The relation of handling to decay in California navel oranges, season of 1910–11, A. V. Stubenrauch (*U. S. Dept. Agr., Bur. Plant Indus. Doc. 676, pp. 7*).—In view of the heavy percentage of decay from blue mold observed in shipments of navel oranges early in the season of 1910–11, the Bureau of Plant Industry continued its handling and packing experiments along lines similar to those followed in the earlier investigations (E. S. R., 20, p. 43). The results are summarized in tabular form and discussed.

The average percentage of decay in all carefully handled oranges, including those brushed, washed, and not cleaned, was 2.8 as compared with an average of 14.9 per cent decayed for the commercially handled fruit. These results corroborate the results of the earlier work in every respect and show that even under the unfavorable weather conditions prevailing during the season fruit may be handled with sufficient care to insure its sound condition on arrival in market.

Report of the coffee expert, J. W. Van Leenhoff (*Porto Rico Sta. Rpt. 1910, pp. 37, 38*).—Weather conditions continued unfavorable for securing definite results in the various experiments with coffee (E. S. R., 24, p. 150).

The new plantings of Porto Rican and foreign coffees are doing well. Several samples of roasted coffee were sent to different persons in the States and on the island, and nearly all reports from the cup trials agree as to excellency of the Maragogype coffee. A few trees of an excellent coffee, Mocha or Inhamban, were discovered near Mayaguez. Seeds of this variety are being propagated with the hope of introducing its cultivation among the planters. Leaf weevils are still doing much damage to coffee and experiments for their control have thus far been unsuccessful. Coffee leaf blight and borers in the shade trees continue unchecked thus far. *Stilbum flavidum* is spreading rapidly in the vicinity.

The crop of coffee in the 9½-acre renovated grove was considerably damaged by storms, only 2,468 lbs. of coffee being harvested and marketed as compared with 2,723 lbs. in the previous year. The total cost of producing 100 lbs. of coffee was $5.25 and the average price obtained $11.03. Owing to the use of the crop from the young plantation for seed distribution and samples, no definite data were secured this year as to its cost.

The Department of Agriculture in relation to a national law to prevent the importation of insect-infested or diseased plants, JAMES WILSON (*U. S. Dept. Agr., Office Secretary Circ. 37, pp. 11*).—In view of an evident misunderstanding as to the intent of the above proposed act in its relation toward nurserymen, the present circular contains a statement of the conditions calling for such legislation, a history of efforts to procure it, and an explanation of the scope and working of the bill now before Congress and the relation of the Secretary of Agriculture and his assistants to the enforcement of such a measure.

FORESTRY.

The prairies in Central North America and their value for forest culture, H. P. BAKER (*Die Prarien in Zentralnordamerika und ihr Wert fur Forstkultur. Inaug. Diss., Univ. Munchen, 1911, pp. 94, figs. 11*).—This is a dissertation on this subject, based on a 4-years' study of that portion of the United States situated between the Mississippi River and the Rocky Mountains.

The subject matter is discussed under the 2 general headings of (1) the origin of the American prairies and the reason for their treelessness and (2) the future importance of forests in the prairie States. Suggestions are also given relative to reforestation.

On the basis of the results of his own study, as well as those of other investigators, the author concludes that the prairies of the Mississippi Valley were covered with forests in prehistoric times, and that the subsequent absence of trees on the prairies is due to a combination of causes, such as fire, wind, lack of rainfall, and unfavorable soil conditions. An increase in the cultivated areas and in the forest plantations will result in a considerable modification of the rough wind currents as well as certain increase of moisture and rainfall. Although conditions are not so favorable for tree growth as in the States east of the Mississippi, the control of prairie fires will render forest culture on the prairies profitable.

The management of Vermont forests with special reference to white pine, A. F. HAWES (*Vermont Sta. Bul. 156, pp. 99–139, pls. 8, figs. 8*).—The purpose of this bulletin is to describe the kind of thinnings and final cuttings applicable to the forests of Vermont, and especially to pine forests.

The phases discussed in part 1 include thinning and cutting, tree growth, improvement thinnings, removal of underbrush, pruning, final cuttings, clean cutting with planting system, and the natural reproduction of forests. Part 2 contains volume, yield, and growth tables for white pine as published by H. O. Cook (E. S. R., 20, p. 541). Part 3 contains suggestions for and specific examples of the management of pure and mixed white pine stands, together with a discussion of white pine seeding, market for pine, insects, diseases, and other enemies of white pine, forest fires, and grazing.

Windbreaks: Their influence and value, C. G. Bates (*U. S. Dept. Agr., Forest Serv. Bul. 86, pp. 100, pls. 20, dgms. 35*).—This bulletin comprises as a whole a consideration of the protective value of timber tracts. The study is based on a large amount of data collected in the Middle West, which show the effects of windbreaks upon field crops. From these data calculations of the net value of windbreaks to the average farm have been made.

Part 1 contains general observations relative to conditions in the region studied, together with a discussion of the important winds of the United States, the utility of windbreaks, how windbreaks act, and the system of measuring influences. Part 2 outlines the methods of measuring various physical factors, such as sunlight, soil moisture and fertility, mechanical power of winds, evaporation, heat, and humidity, and presents in several diagrams and tables the results obtained from measuring these various factors, together with the conclusions which may be drawn from a careful analysis of the effects of windbreaks on each factor influencing plant growth. Part 3 discusses the direct results of windbreak plantings as indicated by the yields and market values of timbers and presents data secured from plantations of cottonwood, green ash, silver maple, willow, honey locust, osage orange, Russian mulberry, catalpa, white pine, and Scotch pine. Part 4, which summarizes the investigation, discusses the calculation of the size of efficient windbreaks as determined by their value and form, gives a plan for the location of windbreaks on a 160-acre farm in the Middle West, together with suggestions for the establishment of windbreaks in the Northern Prairies, the Lake States, the Eastern States, and the Southwest States, as well as the fruit growing regions of the Pacific Coast States.

From the investigation as a whole the author concludes that the right kind of a windbreak in the right place is the source of profit and of comfort, and that it has a considerable esthetic value on the treeless plains of the Middle West. The prejudice which exists against the use of windbreaks is attributed to 2 things: First, experience with poorly planned and poorly planted windbreaks, and second, a lack of appreciation of the protection and profit which a windbreak affords.

National Forest Administrative Act (*U. S. Dept. Agr., Office Solicitor Circ. 54, pp. 9*).—The substance of the decision of the Supreme Court of the United States, including the opinion of the Court relative to 2 cases in violation of the National Forest Administrative Act of June 4, 1897, is given to show that the Supreme Court not only unanimously sustained the constitutionality of that act, but also the validity of the regulation of the Secretary of Agriculture requiring persons, who desire to pasture stock on the National Forests, to secure a permit and pay a fee therefor.

Forestry in Norway, S. B. Meyer (*Jour. Bd. Agr. [London], 18 (1911), No. 5, pp. 385–394, pl. 1*).—This comprises a sketch of the growth and work of the Norwegian government forest service, together with notable examples of private forest enterprises.

Annual progress report of forest administration in the Western and Eastern Circles of the United Provinces for the forest year 1909–10, P. H. Clutterbuck and H. Jackson (*Ann. Rpt. Forest Admin. West. and East. Circles [India], 1909–10, pp. 18+7+18+XCIX+4*).—This is the usual progress report relative to the constitution, management, and exploitation of the state forests in the Western and Eastern Circles of the United Provinces, including a financial statement for the year. The more important data relative to alterations in areas, forest settlements, surveys, working plans, forest protection and miscellaneous work, yields, revenues, etc., are appended in tabular form.

A research on the pines of Australia, R. T. Baker and H. G. Smith (*Technol. Mus. N. S. Wales, Tech. Ed. Ser., No. 16, 1910, pp. XIV+458, pls. 31, figs.*

349, maps 3).—The research here reported comprises a combined botanical and chemical study of the Australian pines, undertaken to ascertain the extent of the commercial possibilities of these trees. Except where material was unprocurable, the species of some 12 genera are treated according to the following arrangement: Historical botany of the species; systematic descriptions; the leaves and fruit—economics, anatomy, and chemistry of the oils; the timber—economics, anatomy, chemistry of its products, and forestry; and the bark—economics, anatomy, and chemistry of its products. The more important results from the research are presented in summarized form.

From a botanical standpoint, the generic results of the research were greater than the specific results since the peculiarities of structure were found to be quite characteristic of and differing considerably from those of cognate genera. Chemically and economically the results promise to be of great importance and to open new fields for commercial enterprise.

Seeds and seedlings of the conifers, R. Hickel (*Bul. Soc. Dendrol. France, 1911, Nos. 19, pp. 13–115; 20, pp. 134–204, figs. 93*).—This comprises systematic descriptions of the seeds and seedlings of coniferous trees. In a number of instances keys have been prepared for the determination of different genera and species by the characteristics of the seeds and seedlings.

Grafting the chestnut on other Cupuliferæ, especially on the oak, Prunet (*Jour. Soc. Cent. Agr. Haute-Garonne, 20* (*1910*), *No. 216, pp. 420–424*).—As a result of several years' experimenting, the author concludes that grafting the chestnut on the oak or beech will always remain a botanical curiosity and will prove of no value in combating the ink disease of the chestnut. The planting of resistant varieties such as the Japanese chestnut is pointed out as the best solution for the problem.

[**Experimental tappings with rubber**], T. B. McClelland (*Porto Rico Sta. Rpt. 1910, pp. 39, 40, pl. 1*).—Some experimental tappings of 7 and 8-year-old Castilla rubber trees were made on the station grounds, the herringbone system being used. One of the largest of the 8-year-old trees tapped on April 15 and the wound shaved on April 18 and 20, yielded 40, 18, and 10 gm. of dry rubber for the 3 dates, respectively. Upon examination in August, the incisions made on the tree tapped in April seemed to have widened rather than to have made a successful effort in closing the wound. New incisions between the old scars gave almost no latex, but a good flow was obtained from the other parts of the tree. Since the cuts heal over very slowly, the herringbone system is not considered suitable for Castilla. Fourteen trees averaging 28½ in. in girth 3 ft. above the base were tapped in August yielding in all 279 gm. of dry rubber from latex and 70 gm. of scrap. The relative amounts of dry rubber bore no relation to the quantity of latex per tree.

The culture of Hevea.—The planters' manual, P. J. S. Cramer, trans. by É de Wildeman (*La Culture de l'Hevea. Manuel du Planteur. Amsterdam and Paris, 1911, pp. XXI+132, pls. 25, figs. 23*).—A French translation of the author's work, which is previously noted (E. S. R., 25, p. 449).

DISEASES OF PLANTS.

Plant disease observations at the experiment station of the Swedish Seed Association at Ultuna, 1910, E. Henning (*Sveriges Utsädesför. Tidskr., 21* (*1911*), *No. 2, pp. 78–83*).—Discussions are given of rust on winter wheat, the appearance of black rust on oats and barley, naked smut of barley, and other plant diseases observed during the summer of 1910.

Fungi exotici: XII, G. Massee (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1911, No. 5, pp. 223–226, pl. 1*).—Eleven new species of fungi are described from material sent from the Malay Peninsula, Tropical Africa, Natal, and Queensland, among which is *Puccinia cymbopogonis*, a very destructive parasite on lemon grass in the Botanic Gardens at Entebbe, Uganda.

On a new organ of the Mucorineæ, F. GUÉGUEN (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 24, pp. 1684, 1685*).—The author gives the morphological and cytological characteristics of certain peculiar bodies which were found on the hyphæ of a new species of Mucor and suggests the physiological function of these bodies. The bodies, which are oblong and bladder-like, with digitate prolongations, were produced on sporophore-like structures and are supposed to be organs for the elimination of certain metabolic products of the fungus.

Some experiments with fungicides used for the prevention of stinking smut, F. DITZELL and R. G. DOWNING (*Agr. Gaz. N. S. Wales, 22 (1911), No. 4, pp. 341–357*).—This is a report of further experiments with fungicides (E. S. R., 23, p. 742). The relative efficiency of the various fungicides in destroying the bunt spores, the effect of the fungicides on germination, and the efficiency of each fungicide in preventing reinfection are given in tabular form.

Copper sulphate, copper sulphate and lime water, copper sulphate and salt (NaCl), copper sulphate solution in water, Fungusine, and Bordeaux paste all proved excellent preventives of bunt and each was also satisfactory in preventing reinfection, but the copper sulphate and salt solutions seriously injured the germination of the grain. Formalin, scalecide, and lysol were not regarded as satisfactory fungicides for the control of bunt.

On potato leaf blotch and leaf curl, A. S. HORNE (*Jour. Roy. Hort. Soc. [London], 36 (1911), No. 3, pp. 618–623, pl. 1*).—The author describes the occurrence of a form of leaf curl in Scotland which developed on the President variety of potato, the seed tubers of which originated from tubers imported from Holland.

Plants grown from native seed tubers of the same variety were free of the disease.

The plants which were examined late in the season were stunted and yellowish with leaves more or less curled and marked with dark brown patches, much smaller and darker than those caused by the late blight. Cross sections of the blotched areas showed that the epidermal cells of both surfaces were diseased and discolored, especially the guard cells of the stomata. The disease extended inward to the palisade tissues and mesophyll and sometimes reached as far as the fibrovascular bundles, but there was nothing to indicate that the diseased spots originated from the bundles. Among the several kinds of spores found on the surface of the leaves were those of a Macrosporium.

It is suggested that the fungus associated with this disease exists on the skin of the potato, and that, owing to the elongation of growing organs, it is carried upward externally to the various parts of the plant.

Articles by the committee on the leaf-roll disease of the potato, F. W. DAFERT (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 5, pp. 757, 758*).—This is a brief note on the personnel of the committee appointed to investigate the leaf-roll disease of the potato in general, and on the scope of the work.

Articles by the committee on the study of the leaf-roll disease of the potato.—II, Studies on the cause and propagation of this disease, G. KÖCK and K. KORNAUTH (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 5, pp. 759–805*).—As a result of their investigations, the authors decide that the leaf-roll disease can be propagated from one year to the next by means of diseased seed tubers, i. e., from seed tubers grown on leaf-roll diseased plants; also that infected soil is capable of producing the leaf-roll disease in plants grown from sound seed tubers under conditions favorable for the development of the causative organisms.

After a discussion of the opinions of various investigators as to the cause of this disease, the results are given of chemical analyses and mycological studies of sound and diseased tubers. A mycological study of diseased tubers showed the presence of a Fusarium in the fibrovascular bundles in many instances, while in sound healthy tubers no mycelial threads were found.

A bibliography is appended.

The leaf-roll disease of the potato, R. Schander (*Ber. West Preuss. Bot. Zool. Ver., 32 (1910), pp. 70–77*).—In a paper read before the thirty-second meeting of the West Prussian Botanical and Zoological Association held at Mewe in 1909, the author gives the symptoms, means of dissemination, effects on the yield, and methods attempted for the control of the leaf-roll disease of the potato.

On the American gooseberry mildew and the black wart disease of the potato.—II, Studies on the cause and propagation of this disease, K. Köck (*1911), No. 5, pp. 565–568*).—The authors give a brief history of the prevalence and dissemination of these two diseases and the remedies used for their control.

The American gooseberry mildew, E. S. Salmon (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 331–335, pls. 2*).—Previously noted from another source (E. S. R., 25, p. 248).

New experiments on the control of the American gooseberry mildew, Wagner (*Deut. Obstbau Ztg., 1911, No. 15–16, pp. 247, 248*).—Previously reported from another source (E. S. R., 24, p. 452).

The relationship between the weather and grape mildew in Hungary, G. de Istvánffi and F. Savoly (*Rev. Vit., 35 (1911), No. 910, pp. 613–621*).—A study is reported of the progress of the mildew in 1910 and of the climatic conditions of those regions in Hungary devoted to grape culture, including the winter weather for 1908–9 and 1909–10, changes of temperature, rains, humidity of the air, fogs, dews, cloudiness, and winds.

It was found that the mildew increased in direct proportion to the amount of precipitation; that humidity of the air was the most important factor in the appearance of the mildew, which was always preceded by a high degree of humidity in the regions in question; and that the weather during the winter did not appreciably affect the mildew but that the distribution of the rains in Hungary during April determined the locality of the first appearance of mildew, while the later rains during May and June determined the direction and intensity of its spread.

Comparative experiments with certain sprays for controlling the downy mildew (Peronospora viticola) of the grape, A. Bretschneider (*Ztschr. Landw. Versuchsw. Österr., 14 (1911), No. 5, pp. 806–813*).—The effects noted as to the control of the downy mildew are given for (1) 1 per cent Bordeaux mixture, (2) 1 and 2 per cent solutions of Tenax, (3) 1 and 2 per cent solutions of Cucasa, (4) a 3 per cent solution of copper-soap mixture, (5) a 0.25 per cent solution of "Crystalazurin" solution, and (6) 1 and 2 per cent salt solutions made from certain rare earths.

Apple rust, N. J. Giddings (*Farm and Orchard, 1 (1911), No. 12, pp. 3–5, figs. 3*).—Attention is called to the general prevalence and severity in West Virginia during 1910 of this disease, which not only attacked the leaves, but severely infected the fruit. It is suggested that moist, warm weather during March or early April followed by cold weather during late April or May are important weather conditions favoring the infection of apple trees by the cedar rust. It would seem that the time of spraying rather than the kind of spraying is the most important factor in controlling this disease.

A canker of apple trees caused by the brown rot fungus, E. S. SALMON (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 355–357, pls. 3*).—Previously noted from another source (E. S. R., 23, p. 548).

Sooty blotch: A new fungus disease of apples, E. S. SALMON (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 351–354, pl. 1*).—Previously noted from another source (E. S. R., 24, p. 450).

An uncommon disease of plum trees, F. T. BROOKS (*Gard. Chron., 3. ser., 49 (1911), No. 1276, p. 374*).—Attention is called to the killing of Rivers Early plum trees in England by *Dermatella prunastri*, a fungus which usually lives as a parasite only on the smaller branches of Greengage plum trees, causing a kind of die-back. In this instance it had attacked the larger branches and even the trunks of the trees.

Peach freckle or black spot, I. B. P. EVANS (*Agr. Jour. Union So. Africa, 1 (1911), No. 5, p. 696, pl. 1*).—The author reports the prevalence of black spot (*Cladosporium carpophilum*), especially on peaches, describes the general symptoms of this disease, and gives the remedies to be used in combating it. Three applications of Bordeaux mixture are recommended as the most effective treatment for the disease, the first application (5:5:45) 3 weeks before the buds begin to open, the second (4:4:100) just after the fruit is set, and the third (4:4:100) when the fruit is about half grown.

A leaf spot of the olive and curculio on almonds and peaches, B. V. RAMOS (*Bol. Agr. Téc. y Econ., 3 (1911), No. 30, pp. 500–504*).—Attention is called to a serious attack of leaf spot on the olive, caused by the fungus *Cycloconium oleaginum*, and of curculio on almonds and peaches.

Report of the pathologist, G. L. FAWCETT (*Porto Rico Sta. Rpt. 1910, pp. 35, 36*).—This report includes discussions of diseases of coffee and pineapples, and miscellaneous diseases.

The leaf blight of coffee caused by *Pellicularia koleroga* has been studied, special attention being given to its life history. No ascigerous stage was found, nor any evidence of propagation by spores. A slow but effective spread was found to occur by the dropping of the leaves carrying the mycelium, or their transportation by the wind to healthy trees, each infested leaf being a source of infection. During dry weather the fungus ceases to grow, gradually dries up, and falls away, but small fragments remain attached to the trees and from these a new growth develops when sufficient moisture is available. At the close of periods of drought is, therefore, the time when spraying can be made most effective. In spraying experiments with various fungicides Bordeaux mixture was found to be the best, owing to its adhering better to the foliage. Spraying, careful pruning, and avoidance of too close plantings promise to control this disease effectively.

A so-called root disease of coffee is noted, in which the trees are killed by being girdled just below the surface of the soil. At first the diseased area is small, but it gradually and slowly spreads. The trouble seems to be produced by the piling up of earth about the base of the trees and by the accumulation of masses of decaying vegetable matter.

The spot of leaf and fruit caused by *Stilbum flavidum* is said to be a serious disease of coffee, but is restricted to a limited area of extreme humidity. The life history of the organism has been studied and experiments for its control are begun.

It is stated that the cultivation of pineapples in clay soils in some of the more humid regions is attended with uncertain results, as the plants during the second and third year become yellow and fail to respond to fertilizers. The roots of such plants are found to be decayed.

A Fusarium disease of bananas is also noted.

Report on the banana disease of Chinsurah, S. K. Basu (*Dept. Agr. Bengal, Quart. Jour., 4 (1911), No. 4, pp. 196–198*).—Attention is called to a disease which is said to be increasing to an alarming extent in certain parts of India. It is more common in old or neglected than in new or well-kept gardens.

The varieties Kanthali and Martaman suffer most, while Champa and Kancha seem to be immune. The main symptoms of the disease are (1) the yellowing of the older leaves, (2) the formation of one or more much reduced leaves at the crown, (3) the gradual withering of the younger leaves, and (4) the final breaking down and death of the plant, which often occurs 10 or 15 days from the first appearance of the disease. Transverse sections near the base of the leaf sheath show black, brown or yellow spots from the size of a pin's head to circular spots 3 or 4 in. in diameter, while longitudinal sections show these spots extending as streaks from the roots upward into the rootstocks and leaf sheaths.

Microscopic examinations of the sections of the rootstock and leaf sheaths reveal the presence of hyalin or slightly colored septate hyphæ in or near the fibrovascular bundles. In some instances colorless, oval spores of Cephalosporium, in balls or clusters on short stalks, were seen within the vessels, but in the course of a day the mycelium produced a new form of crescent-shaped spores corresponding to the Fusarium type. No higher forms of fructification than these were found although the original specimens were kept under observation for over 2 months.

The destruction of diseased plants, the use of healthy suckers for new plantations, and trenching around the new plantations are suggested as means of controlling this disease.

Three fungus enemies of orange trees, H. S. Fawcett (*Proc. Amer. Pomol. Soc., 1911, pp. 190–196, pls. 2, map 1*).—The author gives the characteristics of stem end rot (E. S. R., 25, p. 450), gummosis (E. S. R, 25, p. 456), and scaly bark (E. S. R., 25, p. 551), the damage done by each, and the methods for their control.

The brown spot of the navel orange, J. E. Coit (*Cal. Cult., 37 (1911), No. 3, pp. 51, 52*).—The symptoms of this storage disease of oranges and investigations as to its cause are given.

The disease is characterized by the formation of one to many irregular slightly sunken brown spots of about ¼ in. in diameter over the surface of the orange. These spots extend below the surface to about one-fourth the thickness of the rind. The spotting seems not to occur on fruit left late on the trees and is found so far only on the Washington navel orange. It is uniformly worse on fancy, smooth, thin-skinned fruit. No evidences of fungus or bacterial parasites have been found and the disease appears to be a physiological one somewhat similar to the bitter pit of the apple in South Africa. The results are also given of various experiments with the orange fruit concerning the probable causes of this disease, but nothing definite is reported.

The die-back fungus of Para rubber and of cacao, Thyridaria tarda n. sp., K. Bancroft (*Dept. Agr. Fed. Malay States Bul. 9, 1911, pp. 28, pls. 3, map 1*).—The author gives the history, distribution, and symptoms of this disease and discusses the life history of the fungus, the relation of the parasite to the host, the nomenclature of the Diplodia condition of the fungus, sources of infection, the work of previous authors, and methods of treatment.

In a preliminary note (E. S. R., 24, p. 651) the author gave the results of certain cultural work in which the ascigerous stage of *Diplodia cacaoicola* was claimed to have been obtained. In this paper a more elaborate and detailed account is given of these experiments. It is claimed that successful inoculations and cross inoculations have been obtained with the ascospores of *T. tarda* on both cacao and Para rubber when the infecting material was applied to wounds which reached to the wood of the tree. From the investigations on Para rubber and cacao it is claimed that the life history of the die-back organism consists of 3 forms, viz, the Diplodia stage for rapid reproduction, a Cytospora form which develops on the plant some time after it has died, and the Thyridaria stage which appears later, and which can infect the living plant with the production of the Diplodia form. The fungus must commence its existence on dead tissue, and having accumulated a mass of mycelium spreads to healthy parts of the attacked plant. The damage done by the fungus is closely related to the condition of health of the plant, and this is more evident in the case of older plants.

The occurrence of burs on the trunk of Hevea brasiliensis, K. BANCROFT (*Agr. Bul. Straits and Fed. Malay States, 10* (*1911*), *No. 5, pp. 138–141*).—Attention is called to the occurrence of excrescences or burs on the trunk of *H. brasiliensis* in the Federated Malay States. These burs are referable to 2 distinct sources. One type occurs on untapped trees as well as tapped, while the other type is distinctly the result of wounding by tapping.

The burs of the first type originate as small structures, raising the outer surface of the bark in lumps and in this condition they are known as the "pea disease." Arising in the cortex they have at first no connection with the main wood of the plant, but by continual growth and fusion with each other large structures are produced of irregular shapes, often several feet in size. At first these are superficial to the latex layer, but by further growth they fuse with the main wood and the intervening latex and cambium layers are squeezed out of existence. Each nodule possesses a central woody core composed of vessels which are for the most part irregularly arranged; outside the core is a layer of cambium which produces a slow growth by the addition of wood to the central woody mass. The commonest cause of the production of burs of this type is the wounding of the cortex, such as by the grazing of a cart wheel. Also many of them in their nature and mode of origin seem to be buds which have failed to develop into shoots.

The second type of burs is apparently caused by the tapping knife severing the cambium and wounding the wood.

Nut diseases; with special reference to the pecan, M. B. WAITE (*Proc. Amer. Pomol. Soc., 1911, pp. 182–190*).—In addition to a general discussion of the diseases of the pecan, the author notes a disease of the English walnut (*Pseudomonas juglandis*), almond leaf-blight (*Cytospora circumcissa*), the gumming fungus (*Coryneum beyerinckii*), the crown-gall (*Bacterium tumefaciens*), and the chestnut disease (*Diaporthe parasitica*). The following pecan diseases are noted, their charateristics given, and methods for their control suggested: Pecan scab (*Fusicladium effusum*), the most serious disease of pecans in the Southeastern States (E. S. R., 24, p. 452), pecan rust (*Helminthosporium arbuscula*), mildew (*Microsphæra alni*), leaf blotch (*Cercospora halstedii*), root rot (*Fusarium* sp.), pecan rosette, winter kill, and pecan drop, which is characterized by the shedding of nuts of various sizes, due apparently to a physiological cause.

Notes on fungus diseases, L. H. PAMMEL (*Abs. in Science, n. ser., 33* (*1911*), *No. 862, p. 28*).—At the April meeting of the Iowa Academy of Sciences attention was called to a very destructive Exoascus on the hard maple in the Rocky Mountains, an Exoascus on the oak, *Fomes igniarius* on the quaking aspen in the Wasatch Mountains in Utah, and a Pleurotus on box-elder and other deciduous trees in Iowa.

Zythia resinæ as an injurious timber fungus, C. BRICK (*Stat. Pflanzenschutz Hamburg* [*Ber.*], *12* (*1909–10*), *pp.* [*25–32*]; *Jahresber. Ver. Angew. Bot., 8* (*1910*), *pp. 164–170*).—Attention is called to a staining of structural timber in which light or dark violet to dirty red-colored spots and larger areas of grays to grayish brown appear in the wood. This staining, it is claimed, is due to the fungus, *Z. resinæ.* The characteristics of the fungus and its synonymy are discussed.

Blue stain on lumber, CAROLINE RUMBOLD (*Science, n. ser., 34 (1911), No. 864, pp. 94–96*).—The results are given of experiments with different chemicals in preventing the blue stains on lumber caused by fungi, especially by certain species of Ceratostomella and Graphium.

Sap boards of yellow pine, red gum, green yellow pine, and green red gum were dipped in hot and in cold solutions (from 1 to as high as 10 per cent) of sodium carbonate and sodium bicarbonate, after which the boards were inoculated with the spores of *C. echinella.*

These tests showed that an 8 per cent solution of sodium carbonate was as effective as an 11 per cent solution of sodium bicarbonate. These strengths prevented blue staining on red gum when the weather was rainy, while in dry weather a 5 per cent sodium carbonate and a 4 per cent sodium bicarbonate solution kept yellow pine boards unstained.

Freshly cut red gum and yellow pine sap boards required 8 per cent sodium carbonate and 10 per cent sodium bicarbonate solutions to prevent blue staining when the fungi were growing vigorously. A greater resistance to the alkali in the medium was shown by the spores of Ceratostomella than by the mycelium.

A disease of orchid leaves, F. T. BROOKS (*Gard. Chron., 3. ser., 50 (1911), No. 1281, p. 27*).—Attention is called to a recent outbreak in the orchid house at the Cambridge Botanical Garden of leaf spot (*Hypodermium orchidearum*) on the leaves of different kinds of orchids, including species of Thunia and Dendrobium.

The disease begins at the apex of the leaf and spreads downward, producing a discoloration of the affected areas and finally the death of the leaf. It is checked by sponging the leaves with a dilute solution of potassium permanganate.

Extermination of eelworms, J. SMITH (*Gard. Chron., 3. ser., 50 (1911), No. 1280, p. 7*).—It is claimed that by top-dressing the pots containing the infected plants with rape meal the eelworms in the soil are destroyed and the diseased plants benefited.

The chemistry of lime-sulphur wash, W. B. BURGESS (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 61–69*).—The author gives the results of investigations as to the most satisfactory proportion of lime and sulphur for making the wash, and as to the chemical changes which the mixture undergoes when exposed to the air under conditions similar to those which obtain when it is used as a summer spray. No definite conclusions were reached as to the exact proportion between the lime and sulphur but on the whole the most satisfactory ratio seems to be from 150 to 200 lbs. of sulphur to 100 lbs. of lime.

In testing the behavior of the mixture when exposed to air, the amounts of polysulphid and thiosulphate sulphur and of lime were determined. A given amount of the mixture was then exposed to the air and these constituents again estimated. It was found that the wash as a summer fungicide acts in 2 distinct ways, (1) as a contact spray, the polysulphids acting in a way similar to potassium sulphid, and (2) as a protective coating to the leaves, due to the thin layer of finely divided sulphur deposited from the thiosulphates and polysulphids by decomposition.

Some recent experiments with lime-sulphur spray, E. WALLACE (*Proc. Amer. Pomol. Soc., 1911, pp. 272–281*).—This paper is a summary of conclusions, the subject matter of which is embodied in 3 New York Cornell Station bulletins, all of which have been previously noted (E. S. R., 25, pp. 47, 48, 49).

Lime-sulphur washes for use on foliage, E. S. SALMON (*Jour. Southeast. Agr. Col. Wye, 1910, No. 19, pp. 336-350*).—Previously noted from another source (E. S. R., 23, p. 745).

ECONOMIC ZOOLOGY—ENTOMOLOGY.

A biological survey of Colorado, M. CARY (*U. S. Dept. Agr., Bur. Biol. Survey, North American Fauna No. 33, pp. 256, pls. 12, figs. 39*).—This report consists of 3 sections. The first characterizes the 5 life zones which traverse the State, defines their extent and limits, and discusses their agricultural and economic possibilities. The second consists of a complete list of the mammals of Colorado, with brief notes on their habits, distribution, and economic relations The third is a list of the principal trees and shrubs of Colorado observed by the assistants of the Biological Survey during the progress of the work in the State with annotations as to their distribution and abundance.

A colored map of the life zones of Colorado and a complete index of the subject matter are included.

The mammals of Bitterroot Valley, Mont., in their relation to spotted fever, H. W. HENSHAW and C. BIRDSEYE (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 82, pp. 24, figs. 12*).—This is a report of investigations carried on from March 12 to July 14, 1910, and continued in 1911 in cooperation with the Bureau of Entomology and the Montana Station. It also embodies numerous data obtained by assistants of the Biological Survey in previous years. The investigations were undertaken for the primary purpose of ascertaining the particular species of wild mammals in and near the valley which harbor ticks, especially *Dermacentor venustus*, the species chiefly responsible for the spread of Rocky Mountain spotted fever.

"The almost complete restriction of the fever to the western side of the valley has occasioned much speculation and given rise to a theory of its possible connection with some native mammal or mammals living solely on that side; but a study of the range of the mammals of Bitterroot Valley has failed to show that a single species is restricted to the western side. Nevertheless the two sides differ physically so widely as to influence greatly the distribution of mammals. On the west side the mountains rise abruptly, forests or brush covering much of the land except the cultivated tracts; while on the east side a strip of rolling, treeless, sage-covered bench land lies between the river and the mountains. Thus the west side has a somewhat more humid climate than the east, with heavier growth of brush, which furnishes good cover for most of the small mammals, and hence favors the presence of ticks. But on the opposite or less humid side good 'tick country' occurs only around those ranches which nestle close up to the mountains. Ground squirrels, chipmunks, woodchucks, and pine squirrels—animals which were found to be the principal hosts of the nymphs and seeds of the fever tick (*D. venustus*)—are mainly absent from the broad strip of sage-covered bench land."

In the course of the investigations more than 500 mammals were collected in and around the valley and 20 species were found to carry ticks either in the immature or adult stage. "The hosts of fever ticks fall naturally into 2 groups, those that harbor chiefly adult ticks and those that harbor the younger stages. In the former class belong mountain goats, bears, coyotes, badgers, woodchucks, and possibly elk, deer, mountain sheep, rabbits, and domestic stock, as horses, cattle, and sheep. Those of the second class, mainly rodents, comprise ground squirrels, woodchucks, chipmunks, pine squirrels, mice, and wood rats."

Experiments are now being made in the Bitterroot Valley to discover the most practical methods of destroying the several species of mammals that act as hosts for the fever tick. Brief accounts are given of the various mammals of importance and methods for their destruction. An annotated list of the mammals found in and near the Bitterroot Valley, Mont., together with reproduced photographs of many of the species is presented by C. Birdseye (pp. 9–24).

Three important wild duck foods, W. L. McAtee (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 81, pp. 19, figs. 19*).—The vegetable food of wild ducks includes a large variety of plants of which wild rice, wild celery, and pondweeds have been found of especial importance. In the case of 16 of the more important species of game ducks, the stomachs of which have been examined, these 3 foods collectively composed 25.31 per cent of the total food. Their value as duck food is discussed, together with descriptions of each, their distribution, transplantation, and enemies. It is stated that all 3 can be propagated in suitable waters anywhere in the United States.

Directory of officials and organizations concerned with the protection of birds and game, 1911, T. S. Palmer (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 83, pp. 16*).—This, the twelfth annual directory of officials and organizations concerned with the protection of birds and game in the United States and Canada, is revised to July 15, 1911. The arrangement is the same as that of previous issues (E. S. R., 23, p. 554).

Index-catalogue of medical and veterinary zoology, C. W. Stiles and A. Hassall (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 39, pt. 35, pp. IV+2655–2703*).—This part lists the literature by authors from Y to Zypkin.

Report of the entomologist, W. V. Tower (*Porto Rico Sta. Rpt. 1910, pp. 31–34*).—This report consists of brief notes on guava, coffee, and citrus insects, and bees and bee keeping in Porto Rico, and on insect pests in Cuba.

The guava fruit fly, which infests practically all the fruit, and 2 beetles the larvæ of which feed on the fruit, are said to be the most destructive of the insects attacking the guava. An ant, which lives in the coffee shade trees and occasionally in the coffee itself, is the source of serious injury to coffee. Successful results are reported to have been obtained from the fumigation of citrus trees. At the present time there seems to be a bright future for the bee industry in Porto Rico as there are no diseases, and where Italian bees are used bee moths are not troublesome. A law intended to prevent the introduction of bee diseases was passed by the last session of the legislature.

A trip to Cuba was made in June and July, 1910, with a view to studying the sugar cane insects of the island and obtaining parasites of the Lachnosterna beetle. However but 2 specimens of this beetle were found. Many of the planters recognized it from descriptions given and all stated that its flight occurred during March, April, and May, which is the same time that its flight takes place in the district of Mayaguez, Porto Rico. The flight of this beetle was found to be the same in all parts of Cuba visited, namely, Santiago de Cuba, Habana, Ceballos, Cienfuegos, and Manzanilla. The sugar cane insects of Cuba are said to be similar to those of Porto Rico.

The insect pest of the Mokameh Tal lands, E. J. Woodhouse and H. L. Dutt (*Dept. Agr. Bengal, Quart. Jour., 4 (1911), No. 4, pp. 198–213, maps 2*).—The cutworm *Agrotis ypsilon* has been found to do serious damage in the Tal lands in the vicinity of Mokameh. It produces 2 broods a year on these lands, the second brood being responsible for the damage. *Prodenia littoralis* appeared as an accidental pest in 1910.

Annual report of the entomologist for the year 1909–10, T. J. Anderson (*Dept. Agr. Brit. East Africa Ann. Rpt. 1909–10, pp. 147–162*).—Brief accounts are presented in this report of the insects injurious to man and animals, timber, the coconut palm, and orchard and garden crops.

Insects in a quantity of castor cake and stored grains in the central seed store (*Dept. Agr. Bengal, Quart. Jour., 4 (1911), No. 4, pp. 213–216*).—This is a brief report of insects affecting stored grain in Bengal.

The Indian-meal moth and "weevil-cut" peanuts, C. H. Popenoe (*U. S. Dept. Agr., Bur. Ent. Circ. 142, pp. 6, fig. 1*).—The advent of the mechanical thresher has resulted in a much larger percentage of broken peanut shells, it being estimated that between 20 and 30 per cent of the peanuts are injured in this manner. Consequently they become seconds and in nearly every case infestation follows in a very short time after they are stored. In a footnote, F. H. Chittenden estimates the loss to the peanut dealer at 20 per cent, or at a conservative estimate $3,000,000, for 1910. This is based on the assumption that the percentage of the insect injury is the same as that to stored cereals. The practice of piling sacked nuts high in the storage warehouses, which makes it necessary for workmen to climb upon the stacks, thus breaking many more, also increases the percentage of infestation through affording ingress to the pests.

The Indian-meal moth (*Plodia interpunctella*), a common and well-known pest, habitually frequenting all places where foodstuffs and cereals may be stored, is the insect chiefly concerned. "In addition to the Indian-meal moth, several other insects are frequently found to injure peanuts in storage. These, in the order of their importance, are as follows: The rust-red flour bettle (*Tribolium navale*), the saw-toothed grain beetle (*Silvanus surinamensis*), the cadelle (*Tenebroides mauritanicus*), the fig moth (*Ephestia cautella*), and the Mediterranean flour moth (*E. kuehniella*). The 3 former species are capable of cutting through the shells of peanuts, but rarely occur in such numbers as to be injurious to them."

Descriptions are given of the stages of the Indian-meal moth, its life history and habits. It has a number of natural enemies, of which the 2 hymenopterous parasites *Omorgus frumentarius* and *Hadrobracon hebetor* are the most important. Remedial measures are considered under the headings of heat and fumigation. The author reports having used the heat treatment very successfully in a peanut mill in Virginia.

"Sufficient radiator surface should be supplied to obtain a temperature of 120 to 125° F. A few courses of 1¼ in pipe placed along the side walls should easily bring about the desired results. . . . To permit the most effective penetration of the heat, the bags of nuts should be piled only a few feet deep, as experience has shown that some time is required for the peanuts within the piles to be raised to a uniform high temperature. The building should be closed tightly and the temperature raised to 120° F., remaining at this point for at least 6 hours. . . . The temperature should not be raised above 125° F. in the case of peanuts, as experiments have shown that a slight degree of blanching, or slipping of the 'skin' takes place in shelled Spanish nuts exposed to such a heat. . . . Germination is likewise unaffected, peanuts exposed 6 hours to a temperature of 140° germinating better and more quickly than those unheated. A temperature of 116° is fatal to insect life in a short time, larvæ, pupæ, and adults of the Indian meal moth dying in less than ½ hour, when exposed."

Care should be taken that the factory is kept free from an accumulation of moths during the summer. To this end, all cars of infested peanuts coming into the factory should be fumigated before entrance. Preventive measures to be made use of by the grower include the proper selection and operation of the peanut picker or thresher and the disposal of all nuts before June 1.

Heat as a means of controlling mill insects, G. A. Dean (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 142–158, charts 9*).—The author reports laboratory and mill experiments conducted in order to determine the amount of heat necessary to kill the important mill insects.

In a laboratory series of experiments in which all stages of *Tribolium confusum*, the larvæ and pupæ of the Mediterranean flour moth, and adults of the rice weevil and of *Tenebrioides mauritanicus* were used, a temperature of 115° for a period of 12 hours proved fatal to all.

The mill tests were made in a 4-story building with heavy brick walls, tight wooden floors, and no basement, all stories being heated with steam and well filled with machinery. In a test in which heat was applied for 24 hours and the maximum temperature registered was 105° on the first floor, 133.5° on the second, 141° on the third, and 128.6° on the fourth, all the insects on the 3 upper floors, including the larvæ, pupæ, and adults of *Tribolium confusum* and several other common mill insects, were killed with the exception of one corner on the fourth floor. Upon a second examination of the mill 3 weeks later, no live insects of any sort were found above the first floor.

Citrus fruit insects, H. J. QUAYLE (*California Sta. Bul. 214, pp. 443–512, figs. 74*).—A summarized account of 19 of the more important insect enemies of citrus fruits, their natural enemies, and means of control. Methods of fumigation are briefly described and the text given of the section of the state law on orchard and nursery inspection.

On some important insect pests of the Coniferæ of the Himalaya with notes on insects predaceous and parasitic upon them, E. P. STEBBING (*Indian Forest Mem., Forest Zool. Ser., 2 (1910), No. 1, pp. 1–7, pl. 1*).—In this the first part of the volume, insect pests of the deodar (*Cedrus deodara*) are dealt with. Four species are described as infesting the bast layer of the main stem and the larger branches of old trees, 2 as infesting the main stem of saplings and poles, 3 as infesting the crown and leading shoots of saplings and seedlings, 5 as infesting the twigs and buds, 2 as infesting the needles, 2 as infesting the cone, 3 as infesting the root, and 1 as infesting the wood.

Oviposition among tree crickets, P. J. PARROTT (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 216–218, pl. 1*).—This paper deals with observations upon the egg-laying habits of *Œcanthus niveus*, *O. nigricornis*, and *O. quadripunctatus*.

The author found that when apples and raspberries were grown together in the same cage *O. niveus* invariably laid its eggs in apples, but that in the absence of other plants it would deposit eggs in raspberries. *O. nigricornis* and *O. quadripunctatus* always preferred raspberries, but when *O. nigricornis* had no alternative it sometimes laid eggs in apple wood, usually selecting the tips of the new growth.

Economic importance of Stictocephala, H. OSBORN (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 137–140*).—The author reports that *S. festina* has been found to injure alfalfa in Louisiana through puncturing and sucking sap from the stems. In some instances it has been observed that the punctures have been made in a series surrounding some of the stems, and as a result of this attack the plants above the point of puncture wilt and die.

The woolly aphis, Schizoneura lanigera, H. W. LOHRENZ (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 162–170, pl. 1*).—Spraying experiments with kerosene emulsion are reported, together with biological notes.

Macrosiphum destructor and M. solanifolii, EDITH M. PATCH (*Maine Sta. Bul. 190, pp. 81–92, figs. 14*).—This is a discussion of the structural characters, classification, and biology of *M. destructor* and *M. solanifolii*, the exact position of which has not as yet been determined. On account of the uncertainty as to whether or not "*pisi*" is a composite species in Europe as well as in America, both in collections as well as in literature, the author leaves the problem to European investigators to work out. In this bulletin she discusses the "destructive green pea-louse" of America under the name of *M. destructor*. Whether *M. reticulata* of Sanderson may prove to be *M. solanifolii* or not, the author has at present no biological evidence to indicate, but the structural character of the antennæ and cornicles separate *M. reticulata* from *M. destructor* and show that it is at least closely allied to *M. solanifolii*. Technical descriptions of the winged viviparous, apterous viviparous, and apterous oviparous females and winged male of *M. solanifolii* are followed by detailed descriptions of insectary host plant tests for both.

A bibliography is appended.

The rufous scale at Key West, Florida, A. W. MORRILL (*Jour. Econ. Ent., 4 (1911), No. 2, p. 277*).—The author records the occurrence of *Selenaspidus articulatus* in the United States.

Spraying for the euonymus scale, Z. P. METCALF (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 259–261*).—The author's experiments lead him to conclude that early March, early June, and early August are desirable times to spray for this pest in North Carolina. The spraying experiments lead to the conclusion that "of the 3 materials tried, scalecide, 1:10 in winter and 1:25 in summer, would rank the highest. Next to this we would place kerosene emulsion, 60 per cent in winter and 30 per cent in summer. Either one of these materials seems to be an effective remedy for the euonymus scale. Our experience goes to show that these strengths may be used without any danger of injuring the plant. Commercial lime-sulphur did not prove to be an effective remedy in any of the strengths used, although the hedge sprayed with commercial lime-sulphur showed decided improvement over no spraying at all."

The San José scale and how to control it, P. HAYHURST (*Arkansas Sta. Bul. 107, pp. 369–393*).—This general account of the San José scale, which is increasing in importance in Arkansas, replaces Bulletin 102, previously noted (E. S. R., 20, p. 655). *Aphelinus fuscipennis*, *A. mytilaspidis*, *Ablerus clisiocampæ*, and *Aspidiotiphagus citrinus* have been found by the author to occur in Arkansas as parasites of the San José scale.

Two important cantaloup pests, R. I. SMITH (*North Carolina Sta. Bul. 214, pp. 101–146, figs. 17*).—This general account includes a report of life history studies of the pickle worm (*Diaphania nitidalis*) and the melon worm (*D. hyalinata*), 2 of the worst pests of cucurbitaceous crops, especially of cantaloup, squash, and cucumbers. In Georgia and Florida these 2 species are often of about equal importance, but in the vicinity of Raleigh where the author's investigations have been conducted for the past 2 seasons, and over the greater portion of North Carolina, the pickle worm is more injurious than the melon worm.

The eggs of the pickle worm hatch in from 3½ to 4 days. During normal July and August weather the larvæ require from 12 to 16 days for development. The rate of development for the 5 instars is 2½ days for the first, 2 days for the second, 2 days for the third, 2½ days for the fourth, and 5 days for the fifth, an average from hatching to pupation of about 14 days. The average life cycle was found to be 27 days.

"A full fourth generation occurs in North Carolina, but after the first one the generations are hopelessly mixed and overlapping. With sufficient food supply and warm October weather a fifth generation very probably occurs. Around Raleigh pickle worm moths continue to emerge until the latter part of October, but seldom later.

"The pickle worm does not have any important parasitic enemies in North Carolina, judging by the last 2 seasons' work by the writer. Out of the hundreds of worms collected from the field and bred to maturity no true parasites have been reared with the exception of *Chalcis ovata*, and only one of these has been secured. . . . Predaceous insects kill a small percentage of pickle worms.

In fields about Raleigh the tiger beetle, *Calosoma calidum*, and several ground beetles, such as the common black form, *Harpalus caliginosus*, as well as bombardier beetles of the genus Brachinus, are quite numerous and doubtless prey upon the pickle worm." A predaceous larva which has been identified as *Chauliognathus pennsylvanicus* has been found in large numbers and is an active enemy of the pickle worm.

The author finds that a large proportion of the annual loss due to this pest may be prevented by growing summer squash as a trap crop, by destroying badly infested vines and fruit, and by general clean culture and deep plowing. Poison sprays are of little, if any, value against this pest.

The eggs of the melon worm hatch in warm weather in from 3½ to 4 days. The length of the larval stage was found to be from 13 to 16 days, the pupal stage from 7 to 11 days. The average life cycle proved to be 27½ days during August and September. Three generations occur in North Carolina, the first appearing in June or July, the second during the first part of August, and the last about the middle of September During September and October, 1909, 2 parasites, *Amemphcres* sp. and *Limnerium* sp., were frequently bred from the melon-worm pupæ. *Chalcis ovata* was also reared from the pupa during the same year. The only remedial measures of value against melon worms consist of possible poisoning for those that eat the foliage, and the use of summer squash to help protect the more valuable crops.

Bibliographies are appended to the account.

The apple-tree tent-caterpillar (Malacosoma americana), A. F. CONRADI (*South Carolina Sta. Bul. 158, pp. 3–8, fig. 1*).—This is an introductory report of investigations of the biology of this pest that are now in progress at Clemson, S. C.

"The eggs are deposited during the last week of May and first week of June in masses forming a belt around the small branches. They hatch during the last week of February and the first week of March the following year. The caterpillars spin a tent and use it for headquarters. They become full grown about April 27, when they discontinue social life and scatter to find some sheltered spot for pupation. The adult moths emerge from May 12 to 18, and lay eggs for the generation for the following year.

Potato moth at Patna, E. J. WOODHOUSE and A. P. CHOWDHURY (*Dept. Agr. Bengal, Quart. Jour. 4 (1911), No. 4, pp. 188–192, pls. 3*).—As a protection against *Phthorimæa operculella*, an account of which by H. M. Lefroy has been previously noted (E. S. R., 24, p. 560), the authors recommend that potatoes be stored in dry sand.

Notes on the life history and habits of Pegomya brassicæ, W. J. SCHOENE (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 210–216, pl. 1, fig. 1*).—These notes include observations on the oviposition of the first brood, the number of days from egg deposition to appearance of adults, larval stages and number of days required for the larva to mature, and aerial habits of larvæ, together with the effect of plowing on pupæ.

It was found that in some fields a large percentage of the larvæ work in the top part of the plant during September and October. It is thought probable that the adults are attracted to the "sprouts" because of the tender growth. Rough estimations based on the examination of from 50 to 100 plants in each of a number of fields indicate from 300 to 1,500 maggots per acre. Attention is called to the fact that this aerial habit of the larvæ can be taken advantage of in combating the pest by removing the crop remnants. Observations of plowed and unplowed seed beds showed that only about 27 per cent as many flies emerged from the former as from the latter.

Oriental species of Stomoxys, SOPHIA L. M. SUMMERS (*Ann. and Mag. Nat. Hist., 8. ser., 8 (1911), No. 44, pp. 235–240, figs. 5*).—A table is given for the separation of 10 Oriental species of Stomoxys. One species, *Stomoxys pratti*, is described as new to science.

A fruit fly menace, O. E. BREMNER (*Cal. State Com. Hort. [Circ.], 1911, pp. 3–7, fig. 1*).—This paper calls attention to the danger of introducing the Morelos orange maggot (*Trypeta ludens*) from Mexico, and the melon fly (*Dacus cucurbitæ*) and Mediterranean fruit fly (*Ceratitis capitata*) from the Hawaiian Islands, into California.

House flies, L. O. HOWARD (*U. S. Dept. Agr., Farmers' Bul. 459, pp. 16, figs. 9*).—This account is modified and amplified from Circular 71, previously noted (E. S. R., 17, p. 1094).

The typhoid fly on the Minnesota Iron Range, F. L. WASHBURN (*Pop. Sci. Mo., 79 (1911), No. 2, pp. 137–150, figs. 10*).—An illustrated address delivered at the annual meeting of the Entomological Society of America, on December 28, 1910.

The fleas common on rats in different parts of the world and the readiness with which they bite man, HARRIETTE CHICK and C. J. MARTIN (*Jour. Hyg. [Cambridge], (1911), No. 1, pp. 122–136, pl. 1*).—"*Ceratophyllus fasciatus*, like *Xenopsylla cheopis*, readily bites man. Out of 517 experiments 308 fed, or 59 per cent were positive. In 101 experiments, under identical circumstances with a rat, 59, or 58.4 per cent, of the fleas fed. The experiments with *C. fasciatus* were made upon 8 persons and evidence was obtained of preference on the part of the insects for particular indivduals. One hundred and eleven experiments were made with 46 specimens of *Ctenopsylla musculi*; only 4 fed, or 3.6 per cent, whereas 9 out of 11 fed on a mouse. Sixty-eight specimens of *Ctenophthalmus agyrtes* were tried, in some cases upon 3 persons. None fed, whereas 11 out of 19 of the same fleas fed on a rat under identical conditions."

A bibliography of 32 titles is appended.

Life history of the rice weevil (Calandra oryza) in Alabama, W. E. HINDS and W. F. TURNER (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 230–236, pl. 1*).—The authors find that the period of oviposition is nearly as long as the life of the female, beginning within a few days of her emergence from the grain. The maximum oviposition period observed was 110 days but this female was still active at the time of writing. During this period 417 eggs were deposited.

Hatching occurs in an average of 3 days from deposition of the egg with a mean temperature between 60 and 65° F. "The first larval stage requires about 3 days, the second 4 days, and the third 9 days on the average, with a mean temperature between 60 and 65° F. There is then a distinct prepupal stage in which the forming pupa is plainly visible through the unshed larval skin, lasting usually for one day. The entire larval stage, therefore, requires between 16 and 17 days on the average, with a common range between 15 and 19 days under usual temperature conditons." There seems to be considerable variation in the length of the pupal stage at the same period, with the average at about 6 days and the range between 3 and 9 days.

The breeding of weevils continues more or less steadily throughout the winter provided the temperature remains sufficiently high. "At an average temperature of about 63°, development from oviposition to the emergence of the adult may take place in about 32 days. The general average, however, is rather longer than this, and for the first field generation appears to be about 6 weeks and for the second field generation between 7 and 8 weeks. This is between about the first week of August and the last of October."

Many weevils hibernate in the field, having been found moving in the fields as early as February in Texas after a mild winter and as early as January 30 in Alabama. The average duration of the life cycle during August and September is between 7 and 8 weeks.

The authors found evidence of the occurrence of parthenogenesis.

The cotton square-weevil of Peru and its bearing on the boll weevil problem in North America, C. H. T. TOWNSEND (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 241–248*).—The author has found that the serious affection of cotton in Peru, known for the last 45 years as the "hielo," is apparently due to a small weevil, *Anthonomus vestitus*, or n. sp., the habits of which are similar to those of the boll weevil. Since this weevil does not attack the bolls, due to the fact that in Peru squares are always present, the name cotton square-weevil is given to it.

It is estimated that in Peru the "hielo" has resulted in more damage to the cotton crop than all other causes combined. Numerous weevils were reared from both dried and green squares, both hanging and fallen. The weevil was found to occur commonly and generally, but in limited numbers, throughout the cotton districts of Piura Department during September and October; further investigation shows that it probably occurs throughout the cotton regions of western Peru and Ecuador. It was ascertained that about 23 days elapse from egg to adult during September and October. Search during September and October for weevils feeding and ovipositing in the squares, gave an average everywhere in the cotton region of Piura Department of one weevil to about 20 or 25 squares.

Two species of parasites, probably *Bracon* sp. and *Urosigalphus* sp., have been reared in considerable numbers from the weevil larvæ in the infested squares. The percentage of parasitism has not yet been determined, but the indications so far are in the neighborhood of 30 per cent and perhaps very much more. In spite of an extended search including a 3 weeks' overland trip into the Andes of southern Ecuador, the author has failed to find the square-weevil on any plant other than cotton.

Bee keeping in Maryland (*Maryland Sta. Bul. 154, pp. 227–269, figs. 26*).—This bulletin consists of 2 parts. The first, which is by T. B. Symons (pp. 227–236), deals with the status of bee keeping in the State; the second, by A. H. McCray, of the Bureau of Entomology of this Department (pp. 237–269), discusses the management of bees. A bibliography is appended.

A method of securing the fertilization of clover by means of bumblebees, in experiments with Bruchophagus funebris, F. L. WASHBURN (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 140, 141*).—The technique is described.

A new species of Coccophagus with a table of the host relations of those species of the genus known to the writer, L. O. HOWARD (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 276, 277*).—*C. albicoxa* reared from *Physokermes insignicola* from Lampoc, Cal., is described as new.

The larch sawfly in Minnesota, A. G. RUGGLES (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 171, 172*).—The presence of this insect in Minnesota was first noted in August, 1909, though from the dead and dying tamaracks observed it is thought that the pest must have been at work during the 2 or 3 years preceding. The areas of infestation in the State are one at Itaska Park, a second at Cloquet, and a third near Ely. A hymenopterous parasite determined as *Diglochis* sp. was reared in large numbers, the author estimating that from 10 to 15 per cent of the cocoons were parasitized. In one small area as many as 5 per cent of the 1909 cocoons examined were found to be affected by a fungus disease.

A synonymic index-catalogue of spiders of North, Central and South America with all adjacent islands, Greenland, Bermuda, West Indies, Terra del Fuego, Galapagos, etc., A. PETRUNKEVITCH (*Bul. Amer. Mus. Nat. Hist., 29 (1911), pp. V+791*).—This work is divided into 3 parts. Part 1 (pp. 11-39) consists of a bibliography of 533 titles; part 2 (pp. 41-720) of the catalogue proper, with complete synonymy, references to publications, years, volumes, pages, and figures, as well as to the localities indicated by different authors; and part 3 (pp. 721-790) of an alphabetic list of synonyms.

A handbook of the tsetse flies (genus Glossina), E. E. AUSTEN (*London, 1911, pp. X+110, pls. 10, figs. 24; rev. in Sleeping Sickness Bur.* [*London*] *Bul., 3 (1911), No. 27, pp. 223-225*).—This handbook replaces the monograph by the author, previously noted (E. S. R., 15, p. 621), now out of print, and brings the subject up to date. Fourteen species are described of which 2 are new to science, namely, *G. fuscipleuris* from the northeast of Congo Free State, and *G. medicorum* from West Africa.

A summary of its bionomics, so far as known, is given under the heading of each species, *G. palpalis* excepted.

Supplemental studies of trypanosomes, F. K. KLEINE and M. TAUTE (*Arb. K. Gsndhtsamt., 31 (1911), No. 2, pp. 321-376, pls. 5, figs. 5; abs. in Sleeping Sickness Bur.* [*London*] *Bul., 3 (1911), No. 2, pp. 165-175*).—Investigations of the biology of trypanosomes and tsetse flies and the manner of transmission of the former, conducted in continuation of those by Koch, Beck, and Kleine, previously noted (E. S. R., 22, p. 684), are reported.

A bibliography of 61 titles is appended.

Spraying of woodland and shade trees, L. H. WORTHLEY (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 188-193, pls. 3*).—The data here presented are based on the experiments and experience of the gipsy-moth commission in Massachusetts.

Spraying apparatus for scale insects, E. L. WORSHAM (*Jour. Econ. Ent., 4 (1911), No. 2, pp. 193-199*).—The author considers apparatus and accessories, particularly with reference to their use in controlling the Coccidæ.

The California insecticide law, C. W. WOODWORTH (*California Sta. Circ. 65, pp. 23*).—The text of the California insecticide act of 1911 is here presented and discussed. This law requires manufacturers, importers, and dealers in insecticides and fungicides to obtain, on or before the first day of July of each year, beginning in 1911, a certificate of registration authorizing the sale of insecticides in the State. Insecticides and fungicides must be labeled to show (1) the name, brand, and trade-mark if there be any, (2) the name and address of the manufacturer, importer, or dealer, (3) the place of manufacture, (4) the chemical analysis, and (5) the registry number. The rules and regulations adopted by the United States Government for the enforcement of the federal insecticide act of 1910, also presented, are to be followed in holding private hearings.

Directions are given for the labeling of the various insecticides and fungicides.

Insect powder (*U. S. Dept. Agr., Insecticide Decision 1, pp. 3*).—The Insecticide and Fungicide Board here rules that the term "insect powder" when used without qualification means an insecticide made from the powdered flower heads of certain species of chrysanthemums, namely, *Chrysanthemum* (*Pyrethrum*) *cinerariæfolium*, *C.* (*Pyrethrum*) *roseum*, and *C. marshallii* (*Pyrethrum carneum*). In designating a mixture of powdered flowers and stems, the term "insect powder" may be used, provided this is immediately qualified by word or phrase so as to indicate clearly the nature of the article. Investigations to determine the precise value of the powdered stems are stated to be under way. The terms "Pyrethrum" and "Pyrethrum powder" are, when applied to insecticides, deemed synonymous with "insect powder."

FOODS—HUMAN NUTRITION.

California white wheats, G. W. Shaw and A. J. Gaumnitz (*California Sta. Bul. 212, pp. 315–394, figs. 18, dgms. 3*).—The results are given of an extended series of investigations on the physical characteristics, chemical composition, and milling and baking qualities of white wheats grown in California, more particularly White Australian, Bluestem, Little Club, Propo, and Sonora wheats.

Measurements of the thickness of the bran indicated considerable variation in different parts of the same kernel, "and that the bran from kernels on the center of the head is thicker than in kernels from either end."

The California white wheats, according to the data presented, have a low nitrogen and protein content, the larger normal kernels usually carrying a higher percentage of nitrogen than the smaller kernels of the same type. The wheats are relatively high in fiber and low in ash and ether extract as compared with the hard winter wheats.

The wheat crop of 1905 contained uniformly a lower nitrogen content than did the crop of 1904.

The overlap of gluten nitrogen in the salt soluble extract is represented in the case of white wheat meals by the factor 0.15 per cent; in the case of flour by the factor 0.22 per cent. In the experimental work the polariscopic method for the determination of gliadin proved very reliable, while the mechanical separation of gluten in the case of this class of wheats was very unsatisfactory. The California white wheats contain a larger proportion of their total protein in the form of gluten than do most other wheats, and the gliadin number of these wheats is much lower than for those of the Middle West.

These California wheats ordinarily produce a very white flour which bakes darker than the tinted flours from winter wheats. The water absorption of these wheats is relatively low. The white wheat flours absorb about 52 per cent, and the hard spring wheat flours about 58 per cent.

According to the baking tests, loaves showing the greater loss in baking, other things being equal, are the lighter and whiter. Glutens from white wheat flours are not tenacious in proportion to their gliadin content. When hydrolyzed the glutens of these white wheats gave higher values than other types of wheat, and in general the white wheat glutens were inferior in quality and dull in color.

Wheat investigations—milling, baking, and chemical tests, E. F. Ladd and C. H. Bailey (*North Dakota Sta. Bul. 93, pp. 204–253, dgms. 5*).—The yield, quality, and character of North Dakota wheats were studied in continuation of previous work (E. S. R., 24, p. 760), and in cooperation with the Office of Grain Standardization of this Department.

The average quality of the hard spring wheat of the 1910 crop was found to be superior, both in the yield of flour and in the gluten content and baking strength of flour, to the 1908 and 1909 crops, while the average quality of the 1910 durum wheats was somewhat inferior to that of the two preceding crops. The bearded spring or Velvet Chaff wheats, when dry and well cured, compared very favorably with other hard spring wheats raised in the same localities.

Milling tests with a small two-stand experimental mill showed that, when properly handled, it will produce flours which indicate relative baking qualities, but does not give accurate quantitative milling yields.

"The durum wheats do not necessarily contain more crude protein and gluten than the hard spring wheats, when raised under the same conditions. The composition and feeding value of the by-products or feeds, as a usual thing, bear a distinct relation to the composition of the wheats from which produced, being higher in protein when produced from high protein wheats, and lower in protein when low protein wheats are used. The moisture content of flours and feeds depends to a large extent on the moisture content of the wheat before tempering, when the same method of milling is followed in all cases. With wheats of the same general type the loss in milling due to evaporation runs approximately parallel to and increases with the moisture content of the wheat before tempering, when the same method of milling is employed."

Milling experiments, A. E. V. RICHARDSON and G. H. STEVENS (*Jour. Dept. Agr. So. Aust., 14 (1910), No. 5, pp. 459–465, fig. 1; 14 (1911), Nos. 6, pp. 560–568, figs. 3, dgm. 1; 7, pp. 651–657, figs. 2*).—Studies of the milling and baking qualities of high-grade and low-grade wheats showed, in the authors' opinion, that on the whole the wheats above the standard were of greater monetary value than samples of the same variety below the standard, as they gave a higher yield of flour of higher quality.

A comparative study was made of the characteristics of wheat harvested at the Parafield experimental farm in 1909, and the results are also reported of a study of the absorption of moisture in conditioning wheat, that is, moistening before grinding. Analytical results showed that, "with reasonable care conditioning may be carried out so that practically all the moisture absorbed by the grain will be contained in the external shell, and not interfere in any way with the flour."

With regard to the character of break flour, tests with a number of varieties showed that, "providing a reasonable amount of break flour is produced, and that the breaking process is conducted in a gentle manner with a view to narrowing down the amount of break flour produced, the break flour is invariably superior in color to the bulk flour.

"The superiority of color, however, is not associated with a corresponding superiority in strength. As a matter of fact, the break flours have, without exception, given lower strength than the bulk flours."

In general, the gluten content of the break flour was greater than in the bulk flour, while the break flour was "undoubtedly weaker than the reduction flour."

From experiments on blending it was noted that "the strength of the mixtures obtained from the blending of the flours is considerably above the strength of the corresponding mixtures obtained in blending wheats."

The authors believe that the probable nitrogen and gluten content of any mixture of either wheat or flour may be calculated with considerable accuracy, provided the nitrogen and gluten content of the component parts of the mixture is known.

"The probable strength of a given mixture, either of wheat or flour, can not, however, be determined by simple calculation, but the . . . [figures reported] tend to prove that if a weak or medium strong wheat be mixed with a strong flour wheat considerable improvement in strength of the two former takes place, and the improvement, especially with blends of flour, is considerably in advance of what might be expected from a knowledge of the strength of the originals of the blend."

Analysis of the products of hydrolysis of wheat gliadin, T. B. OSBORNE and H. H. GUEST (*Jour. Biol. Chem., 9 (1911), No. 5, pp. 425–438*).—Studies were undertaken to reduce the discrepancy between the amount of hydrolytic cleavage products recoverable from wheat gliadin and the theoretical amount.

According to the authors, "72.46 per cent of the total nitrogen was recovered in definite form, [and], in fact 75.7 per cent are shown by the complete analysis to be accounted for. This difference is largely due to the decomposition of the bases, tryptophane, and other amino acids during the distillation."

On the dietetic value of the so-called "standard" bread, A. Smetham (*Roy. Lancashire Agr. Soc. Jour., 1911, pp. 19–38*).—From a summary of data the author concludes that the claims of superiority made for whole wheat bread are not substantiated. Particular attention is paid to the importance of mineral constituents, and the author discusses at length the need for a supply of lime for combining with phosphoric acid.

Bakers and baking in Massachusetts, A. W. Brayley (*Boston, 1909, pp. XX+336, figs. 157*).—As the subtitle states, this volume deals with flour, the baking supply, and kindred interests from colonial times to the present day, as well as with the baking trade. A large amount of statistical and other data is included on bread and bread making, bakers' equipment and machinery, the baked bean industry, and other similar topics.

Rice as a foodstuff, H. Aron and F. Hocson (*Biochem. Ztschr., 32 (1911), No. 3–4, pp. 189–203*).—Experimental studies are reported on the balance of income and outgo of nitrogen on a diet of rice supplemented by other foods, chiefly of vegetable origin, including such materials as bananas, rice polish, and phytin.

Analyses of a large number of samples showed that relatively more phosphorus than nitrogen was lost by polishing rice. The unpolished rice contained on an average from 0.7 to 0.8 per cent P_2O_5, undermilled rice from 0.4 to 0.6 per cent, and overmilled rice from 0.15 to 0.4 per cent.

The authors conclude that an exclusive rice diet will not supply protein enough to meet man's demands, and that therefore it must be supplemented by vegetable, or better, animal foods rich in protein. Such a mixed diet is satisfactory from an hygienic standpoint, provided the rice has not lost too much phosphorus by overmilling or polishing. From their experimental studies they conclude further that, for a man weighing 50 kg., a diet made up of rice supplemented by vegetable foods must contain at least 75 gm. protein in order to meet hygienic requirements, and that a diet of rice supplemented by fish or meat must contain at least 65 gm., of which at least ⅓ is supplied by animal foods.

The importance of rice in the Orient and other similar questions are considered.

Studies on chicken fat (*U. S. Dept. Agr., Bur. Chem. Circ. 75, pp. 11*).—Two studies are reported.

The occurrence and permanence of lipase in the fat of the common fowl (*Gallus domesticus*), Mary E. Pennington and J. S. Hepburn (pp. 1–7).—The following conclusions were reached from the experimental work reported:

"Lipase occurs in the crude fat of chickens. The fat of the fowl immediately after killing shows almost no lipolytic activity. It is therefore probable that the lipase during life exists in its zymogenic form. As the chicken ages after death, the enzym becomes active and the acidity of the fat increases. These changes occur less rapidly at temperatures below freezing than above the freezing point. Lipase can resist prolonged freezing for as long a period as 89 months. From the experiments cited it would appear that the post-mortem hydrolysis of chicken fat depends chiefly upon enzym action."

The oxidation of chicken fat by means of hydrogen peroxid, J. S. Hepburn (pp. 8–11).—The influence of oxidation by means of hydrogen peroxid upon the chemical constants of chicken fat and on stearic and oleic acids was studied. The fat was obtained from birds of known history, all the samples with two exceptions being western birds at various stages of their marketing.

A comparison of values before and after oxidation showed that the acidity of chicken fat always increased, while the iodin number usually decreased, although sometimes the reverse was noted. "The saponification number and the Hehner number almost invariably increased simultaneously, hence dilute hydrogen peroxid at the temperature of the water bath produced in chicken fat the same chemical change that occurs in that fat in situ during prolonged freezing.

"Stearic and oleic acids were also oxidized with hydrogen peroxid. The saponification number of the acids decreased. This change is similar to that undergone by the fat of chickens kept hard frozen for a period of 4 months, at the end of which time both the saponification number and the Hehner number were lower than in the fat of fresh birds. . . .

"The changes in the fat of chickens during prolonged freezing are similar to the changes called forth by oxidation of the fat with hydrogen peroxid. The Hehner number and the saponification number increase simultaneously, and aldehydes are formed. The increase in saponification number may, therefore, be ascribed to the formation of slightly lower homologues of the fatty acids of fresh chicken fat, while the increase in Hehner number is doubtless due to the formation of aldehydes and ketones of high carbon content. These changes in the chicken fat in situ are probably produced by the action of enzyms."

Studies of cottage cheese, R. WINDISCH (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 10, pp. 613–615*).—Analyses of a number of samples are reported.

[The use of whale flesh as food], R. C. ANDREWS (*Nat. Geogr. Mag., 22 (1911), No. 5, pp. 411–442, figs. 34; abs. in Sci. Amer., 105 (1911), No. 3, pp. 56, 57, figs. 4*).—Information is summarized regarding the present use of whale meat as food, particularly in Japan, and suggestions are made regarding the possibilities of its general consumption.

Ptomaines in canned fish and crustacea, A. DESGREZ and F. GAIUS (*Compt. Rend. Acad. Sci. [Paris], 152 (1911), No. 13, pp. 893–895*).—Following usual methods, the authors determined the amount of ptomaines in 18 samples of canned goods, finding from 0.2 to 0.6 gm. per kilogram. The results are discussed with reference to methods of preparing and handling foods. The authors found that the bases isolated were relatively not very toxic, but apparently their nature was not determined.

Ripe and unripe bananas, R. REICH (*Ztschr. Untersuch. Nahr. u. Genussmtl., 22 (1911), No. 4, pp. 208–226*).—Analyses are reported of dried ripe bananas of different sorts, unripe bananas, banana flour, skins from ripe and unripe bananas, and fresh bananas of different sorts, the data being discussed in comparison with similar results of other investigators.

The conclusion is reached that in the case of bananas which are shipped green and then allowed to ripen the transformation of starch into sugar takes place normally. The inversion of saccharose, however, proceeds slowly under such conditions, full inversion being noted only under favorable temperature conditions. It appears further that bananas in which the saccharose content is higher than the invert sugar are to be regarded as "unripe." The flavor is flat, and there is little or no aroma.

In general the Surinam, Jamaica, and Canary Island bananas had essentially the same composition, the crude fiber, acid, and ash content of the 3 sorts being practically the same. The nitrogen content of the Canary Island bananas, however, was somewhat higher than that of the other 2 sorts, which are practically alike in this respect.

Particular attention is paid to the discussion of the ash content of bananas and to the relative cost of the fresh and dried fruit.

The composition of tomato catsups, E. W. DUCKWALL (*Canner and Dried Fruit Packer, 33 (1911), No. 2, pp. 34, 36*).—From a summary and discussion of data the author concludes that the ratio of insoluble to total solids, which practically means the ratio of tomato solids to total solids, is the most important of the analytical data usually recorded in the examination of such goods. "This ratio should never be less than 1:7 in good catsup, and if a standard is ever promulgated it is very likely that it will be largely based upon this ratio."

Dirt in food, Emily L. Dove (*Jour. Roy. Sanit. Inst., 32 (1911), No. 6, pp. 321–335, dgms. 2*).—Determinations are reported of the amount of dirt on cress, parsley, fresh and dried fruits, in soda water, milk, and other food materials, and information is given regarding the bacteria, inorganic material, and organic material of which the "dirt" was composed.

As regards the effect on digestion of dirt in food, the author found in artificial digestion experiments that, clean flour under the same conditions was more thoroughly digested in a given time than a like quantity of flour which had dust mixed with it. Feeding experiments with guinea pigs on clean and on unwashed and unsterilized food did not show any differences which would warrant deductions.

Though the study was made with foods marketed under conditions prevailing in London, the results are of general interest.

A discussion follows the paper.

Food chemistry and food control, A. Kraus (*Nahrungsmittelchemie und Nahrungsmittelkontrolle. Leipsic, 1911, pp. X+196*).—This handbook, designed for the use of students and others interested in the subject, has to do particularly with foods in their commercial and technical relations.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 988, p. 1; 989, pp. 2; 991–994, p. 1 each; 996–999, p. 1 each; 1000, pp. 14; 1001, p. 1; 1003–1015, p. 1 each; 1016, pp. 2; 1017, p. 1; 1019, pp. 2; 1020, pp. 3; 1021–1022, p. 1 each; 1023, pp. 2; 1024–1025, p. 1 each; 1026, pp. 2; 1027, pp. 3; 1029, pp. 2; 1030–1032, p. 1 each; 1034, p. 1*).—The following subjects are included: The misbranding of humbug oil, "Eq. nutrine, whole egg substitute," "powd. Alex. senna," coffee, Dr. Moffett's teethina, champagne, rheumatic cure, "Cerrodanie capsules," ginger ale, and "royal lithia water"; the adulteration of desiccated eggs, tomato catsup, tomato pulp, sodic aluminic sulphate, tomato paste, Cayenne pepper, shad, and turpentine; the adulteration and misbranding of a food product ("chocolate cremolin"), turmeric, olive oil, tragacanth, "brace-up tomato tonic," tomato catsup, vinegar, "gr'd Alex. senna," ground kamala, powdered colocynth, maple sugar, lemon extract and vanilla extract, and rice; the alleged adulteration of frozen egg product; the alleged adulteration and misbranding of "soda water sirup cola"; bond forfeiture (wine); and bond forfeiture (coffee).

Special food analyses, 1911, R. E. Rose and A. M. Henry (*Fla. Quart. Bul. Agr. Dept., 21 (1911), No. 3, pp. 110–118*).—The results are given of the examination of a large number of samples of beverages, jams, and miscellaneous food products.

[Food inspection and similar work], J. G. Winkjer et al. (*Bien. Rpt. Minn. State Dairy and Food Comr., 13 (1909–10), pp. 288, pls. 10*).—Of 6,026 samples of foods, beverages, leads, and paints examined, 1,997 were declared illegal. The usual reports are included.

The work of German institutions on the examination of foods and condiments for the year 1907 (*Übersicht Jahresber. Öffentl. Anst. Tech. Untersuch. Nahr. u. Genussmtl. Deut. Reich, 1907, pp. X+50*).—This volume contains lists of names of officials, organization methods, synopses of work, and similar information.

[Living conditions in Samoa], E. Deeken (*Umschau, 15 (1911), No. 35, pp. 713–716*).—Considerable information is summarized regarding the food habits and living conditions of foreign residents in Samoa.

The food of the Tasmanian aborigines, F. NOETLING (*Papers and Proc. Roy. Soc. Tasmania, 1910, pp. 279–305*).—A large amount of data is summarized and discussed regarding the foods and food habits of the now extinct aboriginal inhabitants of Tasmania. As the author points out, there is a general agreement of opinion that the diet was very largely of animal origin, shellfish, game, eggs, etc., being supplemented by a limited supply of vegetable foods.

Free restaurants for nursing mothers (*Restaurants Gratuits des Mères Nourrices. Paris, [1907], pp. 16, figs. 2*).—An account is given of the establishment of restaurants for supplying free food to nursing mothers in Paris and the success which has attended the enterprise.

Household chemistry, J. F. SNELL (*Montreal, 1911, pp. 65*).—In addition to a discussion of the elementary principles of chemistry which are of special interest in this connection, the topics considered are acids, bases, and salts, and their relation to cleaning processes; fats and soaps; and food constituents and their composition, digestion, identification, and chemical characteristics. Appended to the text are a number of tables showing the composition of common food materials and other similar data. The present publication, which the author regards as preliminary to a more extended treatise, brings together in concise form a great deal of interesting material of use to students.

General treatise on nutrition, G. LEBBIN (*Allgemeine Nahrungsmittelkunde. Berlin, 1911, pp. XI+543, figs. 57*).—This handbook contains chapters on meat, fish, game, fruits, vegetables, and other foods, and on beverages.

Nutrition and growth, I, H. ARON (*Philippine Jour. Sci., B. Med. Sci., 6 (1911), No. 1, pp. 1–52, pls. 4, dgms. 5*).—Experimental studies of dogs are reported, together with the results of observations on nursing children.

The author concludes that "a growing animal which receives only sufficient food to keep its body weight constant, or to allow a slight increase, is in a condition of severe starvation. If by a restriction of food the increase in weight is inhibited, the skeleton grows at the expense of other parts of the body, especially of the flesh. Most of the organs retain their weight and size, while the brain grows to reach its normal weight The composition of the body—when at a constant weight—undergoes remarkable changes. Fat is consumed more or less entirely, the quantity of protein, especially of the muscles but not of the organs, is diminished and a great proportion of the body tissues is replaced by water; thus, this water and the increase of the skeleton together replace the body materials lost. The caloric value of 1 gm. body weight of an animal which has undergone such a process to its extreme limit may amount to only one-third of the normal value.

"It is possible by supplying suitable amounts of food to maintain a dog in an emaciated condition, apparently in good health, and at the weight of a puppy, for nearly 1 year, while its weight at the end of the year should be 3 times as great If such an animal is thereupon fed amply, it fattens and rounds out, but does not reach the size of a control animal which from the beginning has been normally fed. It is unable to make good the growth suspended by the long restriction of food.

"The 'growth' principally depends on the tendency to grow possessed by the skeleton. The skeleton loses its capability of growing in more advanced age regardless of the size which the animal has reached."

See also a previous note (E. S. R., 24, p. 765).

The digestibility of white of egg as influenced by the temperature at which it is coagulated, P. FRANK (*Jour. Biol. Chem., 9 (1911), No. 6, pp. 463–470, dgms. 2*).—Some of the conclusions drawn from experimental work are quoted.

"The progress of the hydrochloric acid action and the total digestion is most rapid in the albumin not heated beyond 75° C. . . .

"The rate of digestion seems to progress more evenly with the hydrochloric acid action in the albumin heated up to 75° than it does in the others. . . .

"The progress of the hydrochloric acid action and the digestion while proportionately greater the longer the period of digestion, diminishes relatively as digestion continues. . . .

"It is quite evident, from the results discussed in this paper, that the Mett tube method of standardizing ferments is an unreliable one unless special precautions be taken."

The metabolism of fruit acids in warm weather, B. F. Duckwall (*Canner and Dried Fruit Packer, 33 (1911), No. 2, pp. 38, 40*).—A summary of data regarding the metabolism of fruit acids, and related topics.

Colloidal-chemical analysis of the phenomena of absorption and secretion—absorption in the intestinal tract, M. H. Fischer (*Kolloidchem. Beihefte, 2 (1911), No. 8–9, pp. 304–342*).—An extended digest of data and discussion of digestion from the standpoint of colloidal chemistry.

Muscular work and protein metabolism, A. Pugliese (*Biochem. Ztschr., 33 (1911), No. 1–3, pp. 16–29*).—From studies of the nitrogen content and its distribution in muscles the author concludes that metabolic changes take place either not at all or in very limited degree in muscular work. Practically all the substances withdrawn from working muscles are substances widely distributed in the body and are not to be regarded as abnormal.

The human machine, A. Bennett (*New York, [1911], pp. 123*).—In this volume the author discusses training the mental powers with a view to increased efficiency.

ANIMAL PRODUCTION.

The study of heredity, V. Haecker (*Allgemeine Vererbungslehre. Brunswick, 1911, pp. X+392, pls. 4, figs. 135*).—This is a general treatise on heredity based on results of recent investigations. The contents are grouped under the following headings: Historical introduction, morpho-biological foundations of the study of heredity, Weismann's theory of heredity and problem of the inheritance of acquired characters, experiments in hybridizing, and new morphobiological theories of heredity.

A bibliography is appended to each chapter.

Introduction to the study of heredity, E. Baur (*Einführung in die Experimentelle Vererbungslehre. Berlin, 1911, pp. 293, pls. 9, figs. 80; rev. in Biol. Centbl., 31 (1911), No. 16–17, pp. 543, 544*).—A systematic treatise on heredity from the modern standpoint, based mainly on investigations of recent years with both plants and animals by experimenta methods.

A bibliography of 426 titles is appended.

Introduction to the science of heredity, R. Goldschmidt (*Einführung in die Vererbungswissenschaft. Leipsic, 1911, pp. IX+502, figs. 161*).—This is a course of 20 lectures on heredity based on recent investigations. A bibliography of over 500 references is appended.

A coefficient of individual prepotency for students of heredity, J. A. Harris (*Amer. Nat., 45 (1911), No. 536, pp. 471–478*).—A discussion of the conception of prepotency and methods of measuring individual prepotency. Certain biometric formulas used for other purposes are suggested as well adapted for measuring the desirability of the individual parents for breeding.

On the formation of correlation and contingency tables when the number of combinations is large, J. A. Harris (*Amer. Nat., 45 (1911), No. 537, pp.*

566-571).—Where a number of individuals in an array is small the method outlined is of no very marked advantage, but when the arrays are large it saves much labor and has a wide range of application.

Experimental polyspermy as a means of studying the problem of fecundation, A. Brachet (*Arch. Entwickl. Mech. Organ., 30 (1910), pt. 1, pp. 261-308, figs. 9; abs. in Zentbl. Physiol., 24 (1911), No. 23, p. 1094*).—The author has studied fecundation under abnormal conditions in *Rana fusca* for the purpose of gaining information on the underlying principles. When the sperm was concentrated many spermatozoa could enter the ovum, and if the number entering was small there were as many blastomeres as there were spermatozoa. The female nucleus united with the spermatozoa lying nearest to it. When the number of spermatozoa was large there was more or less union among them, forming groups and chains.

Results obtained thus far furnish further support to the view that the phenomenon of fecundation may be accounted for by forces lying entirely within the nucleus.

Artificial parthenogenesis of frog's eggs, E. Bataillon (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 16, pp. 996-998; 152 (1911), No. 19, pp. 1271-1273; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 6, p. 706; 1911, No. 4, p. 454*).—A minute puncture of the eggs of *Rana fusca* with a fine needle made of glass, platinum, or manganese apparently caused a change in the osmotic equilibrium, as many eggs underwent gastrulation and developed into free larvæ. Segmentation was also induced by injecting into the eggs some mammalian blood, sperms, extract of spleen, carp blood, or extract of testis. The accelerating principle introduced need not be specific. The essential conditions are puncture and the introduction of some foreign cellular elements.

Number of chromosomes in Batrachians and in parthenogenetic embryos, A. Dehorne (*Compt. Rend. Acad. Sci. [Paris], 150 (1910), No. 22, pp. 1451-1453; 152 (1911), No. 17, pp. 1123, 1124; abs. in Jour. Roy. Micros. Soc. [London], 1910, No. 6, p. 706; 1911, No. 4, p. 454*).—The experiments of Bataillon (noted above) were repeated and only 6 chromosomes were found in the cells of embryos from 2 to 6½ days old. The author finds that all the common Batrachians have 12 chromosomes, and not 24 as usually stated.

Studies in experimental embryology.—Effect of radium on the egg of the fowl, G. Vernoni (*Arch. Entwickl. Mech. Organ., 31 (1910), pt. 2, pp. 307-334, pls. 3*).—A detailed report of a study of the changes, both progressive and regressive, brought about by the action of radium on the development of the egg. A review of previous work by other investigators is included.

The state of the ovary in hybrids of the goldfinch and canary, A. Chappellier (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 9, pp. 328, 329, figs. 8; abs. in Jour. Roy. Micros. Soc. [London], 1911, No. 4, p. 455*).—The author examined 25 hybrids between a male goldfinch and female canary, finding various degrees of fertility. In some cases the ovary was rudimentary and no ova were produced. In others, the eggs were small and sterile. Eggs were laid in only about one-fourth of the cases.

Studies in the experimental analysis of sex.—VI, On the cause of the fluctuations in growth of the fowl's comb, G. Smith (*Quart. Jour. Micros. Sci. [London], n. ser., 57 (1911), No. 225, pp. 45-51, pls. 4, figs. 5*).—The results of this investigation, continuing previous studies (E. S. R., 23, p. 173), are summarized as follows:

"The rapid and marked increase in area of the hen's comb is proved both in adult and young hens to occur simultaneously with the periods of egg laying. This increase of the comb in the hen is due to a fatty infiltration of the central connective-tissue core of the comb; the decrease in the comb is due to the abstraction of the fat. The cock's comb contains only small quantities of fat comparatively in the central core, the substance of the comb consisting principally of fibrous connective tissue. The cock's comb does not exhibit marked fluctuations like the hen. The increase in the comb is not accompanied by a rise in general body weight, though such a rise usually occurs some time before the increase and fat deposition occur. The explanation of the fatty infiltration of the comb is found in the fact that at the egg-laying periods the blood becomes charged with fatty material which is conveyed to the ovary for the formation of yolk, and that the excess of this fatty material is deposited in the comb. A close parallel is observed in the fat metabolism of the laying hen and of spider crabs parasitized by Sacculina."

Castration by X-rays, C. REGAUD and T. NOGIER (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 1, pp. 5–7; abs. in Jour. Roy. Micros. Soc. [London], 1911, No. 3, p. 347*).—It was found possible to sterilize the testis of an adult cat by the use of X-rays and without lesion of the skin. Oviform cells survived the exposure, but they gradually diminished in number and the seminal epithelium remained sterile.

Sterilization by X-rays, T. NOGIER and C. REGAUD (*Compt. Rend. Soc. Biol. [Paris], 70 (1911), No. 2, pp. 50–52; abs. in Jour. Roy. Micros. Soc. [London], 1911, No. 3, pp. 347, 348*).—Complete sterilization of the dog was obtained by means of the X-rays. As in the cat, there were some refractory oviform cells, but they were not able to repopulate the seminal epithelium. Sterilization was effected without radio-dermitis by taking precautions.

The geology and paleontology of the caves of Grimaldi, M. BOULE (*Les Grottes de Grimaldi.—Géologie et Paléontologie. Monaco, 1910, vol. 1, pt. 3, pp. 157–236, pls. 6; rev. in Nature [London], 87 (1911), No. 2178, pp. 112, 113, map 1*).—This contains a full account of various animal bones recovered from the Baoussé-Raoussé caves at Mentone.

Of the ancestors of domesticated animals the Equidæ were represented by *Equus asinus*, *E. caballus*, *E. caballus typicus*, and *E. robustus*. Neither *E. przewalskii* nor the zebra appeared to have been present. Remains of *Sus scrofa* were abundant. In the Mentone neighborhood *Bos primigenius* made its appearance quite as early as *Bison priscus*, if not indeed earlier. *Bos longifrons* was absent. *Rupicapra tragus* was of a vigorous type, showing affinities to the chamois of the Alps and the Pyrenees. *Capra ibex* was represented by a large number of specimens, and is considered to be the ancestor of the Alpine goat of to-day.

Conclusions are confirmed that there was no sudden or complete break in the evolution or history of the fauna of western Europe from the Paleolithic to the Neolithic times, with but little natural organic evolution in the larger mammalia from the earliest Pleistocene to the present day, although some of the animals of the Pleistocene have disappeared through changes in climatic conditions or through the hand of man, while others have deteriorated in size and vigor as they have gradually come under the yoke. The horse, however, forms a notable exception, having improved in physique and gained in strength.

College live stock and judging competitions, C. S. PLUMB (*Breeder's Gaz., 60 (1911), No. 7, pp. 240, 241, fig. 1*).—This is a defense of student-judging contests, and a discussion of the merits and demerits of having colleges exhibit live stock at shows. It is stated that both arouse interest and are educational affairs, and are as reasonable and justifiable as student debates, orations, or other intellectual contests.

[The utilization of by-products of the vine as stock feeds], V. VERMOREL and E. DANTONY (In *Utilisation des Sous-Produits de la Vigne et du Vin,* *Paris, 1910, pp. 71–155, figs. 6*).—A summary of information on the nutritive value and methods of preparing grape marc, prunings of vines, and other products of the grape for feeding live stock.

Filling the silo and the cost of silage, C. W. PUGSLEY (*Hoard's Dairyman, 42* (*1911*), *No. 28, p. 858*).—Directions for filling the silo and estimates of the cost of filling are given.

The author found that where it took 18 acres to fill 2 silos of 110 tons each, with corn at 60 bu. per acre, the cost of ensilage per ton was $2.59. Experiences of others are cited to show the cost of filling to range from $1.95 to $2.75 a ton.

Concentrated feeding stuffs, C. S. CATHCART ET AL. (*New Jersey Stas. Bul. 237, pp. 3–56*).—This is the report of the eleventh inspection of concentrated feeding stuffs, and presents analyses of 630 samples of cotton-seed meal, cottonseed feed, linseed meal, mustard seed oil cake meal, gluten feed, distillers' dried grains, dried brewers' grains, malt sprouts, molasses feed, alfalfa meal, barley feed, dried beet pulp, granulated milk, meat meal, beef scrap, by-products of corn, wheat, rye, oats, and buckwheat, and poultry and mixed feeds.

Notice of Judgment (*U. S. Dept. Agr., Notice of Judgment 990, pp. 11*).—This relates to the alleged misbranding of "Corno horse and mule feed."

The high price of meat in Germany according to a recent inquiry: Its causes and remedy by cooperative and other means (*Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Econ. and Soc. Intel., 2* (*1911*), *No. 5, pp. 243–264*).—This inquiry was ordered by the Minister of Agriculture because of the high price of meat in 1910. The farmers have been accused of causing the increase, but inquiry showed that although the number of cattle, calves, and sheep was smaller in 1910 than in 1909, it was greater than the averages for the preceding 10 years, and that more pigs were marketed in 1910 than in any 5 of those years. The increase in price was due largely to the increase of consumption of meat per head of population. Suggestions are offered for increasing the home production of live stock.

Exports of Uruguay live-stock products, F. W. GODING (*Daily Cons. and Trade Rpts.* [*U. S.*], *14* (*1911*), *No. 180, pp. 522, 523*).—This contains statistics on the live stock industry and on the exports of live-stock products.

Margarin in skim milk for fattening calves, A. CHIESI (*Indus. Latt. e Zootec., 9* (*1911*), *No. 8, pp. 121, 122; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 2* (*1911*), *No. 4, pp. 896, 897*).—This is a report of a successful experiment in the use of margarin as a substitute for cream in skim milk. The average daily gain per head was 0.957 kg., and the price realized for the skim milk excluding cost of labor was 8.27 francs per quintal (about 1.5 cts. per quart).

Breeding and feeding sheep, J. W. WILSON (*South Dakota Sta. Bul. 127, pp. 99–120, figs. 13*).—This bulletin reports the result of 6 years' work, the object of which was to ascertain which of 6 breeds of sheep is the best to use on the western-bred ewe, both wool and mutton being considered.

In the fall of 1904 60 western Montana-bred yearling ewes were divided into 6 lots. These were compactly built Merino and Down grades and were quite uniform in size and conformation. Each of these lots was bred to an average pure bred ram of the following breeds: Cotswold, Hampshire, Oxford, Southdown, Shropshire, and Rambouillet. In 1905, the ewes previously bred to the Cotswold ram were bred to the Hampshire, the ewes bred to the Rambouillet ram were bred to the Cotswold, and so on for each lot, changing the breed of ram each year for each lot of ewes.

The ewes lambed in April and May each year, and the lambs were allowed to run with the ewes on blue grass pasture until early fall, when they were separaised and pastured on rape. On January 1 they were divided up as to breeds and fed until April 1 all they would eat of a mixture of 100 lbs. shelled corn, 100 lbs. oats, and 25 lbs. oil meal, with prairie hay. They were then shipped to Chicago and sold on their merits. The dressed weight percentage of each lot for the last 3 years of the experiment averaged as follows: Cotswold grades 52.4; Hampshire 53.4; Oxford 52.9; Southdown 58.1; Shropshire 53.2; and Rambouillet 54.2.

The lambs were sheared 2 weeks before marketing and the clip was shipped to Chicago, graded, and sold on its merits. The average yield in pounds of wool by breeds per head for the 6 years was for the Cotswold grades 7.9, Hampshire 6.7, Oxford 6.8, Southdown 5.6, Shropshire 6.4, and Rambouillet 7.

The number of lambs fed, the daily gains, amount of concentrates per pound gain, and value of wool per head are given in the following table:

Results in breeding sheep for wool and mutton.

Breed of male parent.	Number of lambs fed.	Average gain per head daily.	Amount of concentrates per pound gain.	Average value of wool per head.
		Pound	*Pounds.*	
Cotswold.. ..	55	0.36	5.24	$1.63
Hampshire. .	55	.31	5.87	1.37
Oxford.....	53	.34	5.43	1.36
Southdown...	53	.25	5.64	1.11
Shropshire.	57	.31	5.75	1.36
Rambouillet..	53	.31	5.63	1.24

Descriptive notes are given of each of the breeds represented The death of 10 ewes during the winter of 1910 was attributed by the veterinarian of the station to lack of exercise and the long period of dry feeding. Notes by E. L. Moore of the station on the symptoms, treatment, and precautions to be used against tapeworms in sheep have been noted from another source (E. S. R., 15, p. 87).

The native breeds of swine in Croatia and Slavonia, Ulmansky (*Wiener Landw. Ztg., 61 (1911), No. 52, pp. 596, 597, figs. 3*) —A description of the characteristics of the 3 principal native types of swine, (1) the Siska, (2) the Syrmie-Mangalica, and (3) the Turopolje. A brief account of the methods of swine breeding in Croatia and Slavonia is also given.

Cotton-seed meal feeding experiments with mules and horses, R. S. Curtis (*North Carolina Sta. Bul. 215, pp. 153–169*).—The object of these experiments was to determine the possibility of using cotton-seed meal successfully in rations for work animals, the form and combination in which it may best be fed, and the harmful effects, if any, resulting from its use. The concentrated feeds used were corn on the ear, shelled, and in the form of corn-and-cob meal, cotton-seed meal, and wheat bran. The roughage was mainly corn stover though at times oat hay, pea-vine hay, and mixed hay were fed. In calculating the financial statements the following prices per ton were used: Ear corn $20, shelled corn $25, corn-and-cob meal $20, cotton-seed meal $30, wheat bran $30.

In a preliminary test cotton-seed meal was fed as a supplementary feed to ear corn in quantities up to 1½ lbs. daily to mules. The animals relished the cotton-seed meal only fairly well and its use in this manner is not recommended.

Five mules were fed shelled corn and cotton-seed meal for 6 months. The amount of cotton-seed meal consumed per mule during this period varied from 111.6 to 295.7 lbs. One mule was fed shelled corn only as a check. The mules performed as nearly the same amount of work daily as practicable. In each case the cotton-seed meal ration cost slightly less, and, except in the case of one mule which lost in weight, the mules fed cotton-seed meal made more gains than the corn-fed mule. In this experiment it was impracticable to substitute more than 2 parts of cotton-seed meal for 1 part of shelled corn. Similar results were obtained in another experiment with these 6 mules, in which 1 mule in each team was fed the shelled corn ration, while each team mate was given the cotton-seed meal ration.

In an experiment with 6 mules in which 3 were fed a ration consisting of 7 parts of ear corn, 3 parts corn-and-cob meal, and 1 part cotton-seed meal, against ear corn only for the team mates, the cotton-seed meal was consumed much more readily than in the other experiments. However, the average amount fed daily was only about 1 lb. The cotton-seed meal rations cost slightly less per mule, and, with one exception, less per hour of work performed. In every case there was a gain in weight, but with one exception the corn-fed mules made greater gains.

In a test with 6 mules, corn-and-cob meal was fed in comparison with mixtures in different proportions of corn-and-cob meal, wheat bran, and cotton-seed meal. In each case the cost was more, though the amount of work performed and the gain was less on the cotton-seed meal rations.

The author states that in each case where cotton-seed meal was fed the coat of the animal became smoother and glossier than usual, that the spirit and endurance were not lessened, and that at the end of the experiment no harmful effects could be found as a result of feeding the meal. Farmers are advised not to feed draft animals cotton-seed meal to the extent of more than 10 or 15 per cent by weight of the total ration.

Feeding cotton-seed meal to draft animals, R. S. CURTIS (*North Carolina Sta. Bul. 216, pp. 177-186*).—This is a popular discussion, based on the above experiments and other published matter relative to the use of cotton-seed meal for horses and mules, a digest of which is included. The more general use of cotton-seed meal for work animals by southern farmers is advocated from two viewpoints: First, its high protein content makes it a very desirable concentrate to balance the corn ration usually fed this class of stock; second, a large percentage of its fertilizing value is retained in the manure. The author states that only light yellow cotton-seed meal with a sharp, nutty odor should be used for horses and mules. Four cotton-seed meal rations are included, the quantities suggested being sufficient for medium weight draft animals doing moderate work.

Method for determining weight of parts of eggs, MAYNIE R. CURTIS (*Maine Sta. Bul. 191, pp. 93-112, figs. 3*).—This bulletin presents the results of a study of methods by which an accurate determination of the weight of the several parts (albumin, yolk, and shell) of the hen's egg might be made. "Such methods involve (a) the prevention of loss of weight by evaporation, pending the weighing of the egg, and (b) the accurate separation of the parts of the egg for weighing."

In order to ascertain the amount of evaporation from eggs, 20 Barred Plymouth Rock eggs were brought to the laboratory soon after they were laid and divided into two groups of 10 eggs each. Each of the eggs of one group was sealed in a half-pint fruit jar in which a small amount of absorbent cotton had been placed to prevent breakage. The 10 eggs of the other group were placed in a wire basket on the laboratory table. The eggs were weighed each day for 4 days. The eggs kept in the open air lost daily from 0.04 gm. to 0.13 gm., with a mean of 0.0893 gm., while eggs kept in sealed jars lost from 0 to 0.04 gm., with a mean of 0.0228 gm. That is, keeping the eggs sealed in jars reduced the evaporation to one-fourth of that in the open air.

Before a study of the proportion of parts of eggs could be made it was necessary to determine an accurate method for separating these parts. It was found that this was comparatively easy with boiled eggs. In this work the eggs were weighed fresh and dropped into boiling water, allowed to boil 20 minutes and cooled, and weighed again before separation. The eggs lost from 1 to 1.5 gm. each due to boiling and cooling. To test the loss in weight due to different methods of cooling boiled eggs, some were cooled in water, some in air, and some in sealed jars. Those cooled in the open air lost from 1.49 to 1.75 gm., with a mean of 1.578 gm.; those cooled in sealed jars lost from 1.27 to 1.79 gm., with a mean of [illegible] gm.; and those cooled under water lost from 0.91 to 1.33 gm., with a mean of 1.1425 gm. However, as a loss of more than 1 gm. was deemed too large to be overlooked in a quantitative study of the proportion of parts of eggs, a slight modification of the housewife's method of separating the parts of fresh eggs was devised. It is described as follows: "Break the egg near the center and allow the albumin to run into a receiving dish. Keep the yolk in one half of the shell. Then turn it into the empty half. The yolk is then dried on a filter paper. The shell is also dried on a filter. The yolk and shell are then weighed. The difference between the sum of their weights and the original weight of the unbroken egg gives the weight of albumin."

In an experiment in which 15 eggs were separated fresh and the parts weighed the averages were as follows: Entire egg 58.87 gm., albumin 35.30 gm., yolk 16.82 gm., shell, etc., 6.48 gm., percentage of error in weights 0.46. Similar data for 14 eggs separated after boiling are as follows: Entire egg fresh 54.52 gm., boiled 53.04 gm., albumin 30.61 gm., yolk 16.39 gm., shell, etc., 5.71 gm., percentage of error in weights 0.62.

Diagrams are included showing the relation between the size of the eggs and the loss of weight by evaporation in the open air and the relation between the weight of the whole egg and its parts in eggs separated fresh and after boiling. These diagrams show some positive correlation between the weight of the egg and (1) its loss in weight by evaporation and (2) its percentage of albumin, and a negative correlation between the weight of the egg and the percentage of yolk. No correlation was found between the weight of egg and the percentage of shell.

Illustrated album of pigeons, E. Schachtzabel (*Illustriertes Prachtwerk sämtlicher Taubenrassen. Wurzburg, [1911], pp. 14, pls. 100, figs. 7*).—This contains descriptions and colored plates of all breeds of pigeons commonly kept in Germany.

DAIRY FARMING—DAIRYING.

Feeding experiments with cows and calves, J. Michels (*North Carolina Sta. Bul. 213, pp. 89-97*).—These experiments were undertaken to determine the relative efficiency of narrow and medium wide rations for milk production.

Eight cows from 3 to 6 weeks in lactation were fed 3 periods of 28 days each. In the first and third periods the feed consisted of 5 parts cotton-seed meal, 4 parts wheat bran, 3 parts corn meal, and 50 lbs. corn silage. The nutritive ratio of this ration was about 1:4. During the second period the ration was the same as the above, except that 2.5 lbs. of cotton-seed meal was replaced by 2.5 lbs. of corn meal, giving this ration a nutritive ratio of about 1:57. The results of this test indicate that the narrow ration produced 7.5 per cent more milk fat, and increased the fat test 0.24 per cent and the live weight 30 lbs. The milk yield was practically the same. This trial was duplicated with 5 cows, except that the narrow ration was fed during the first and third periods, and the medium ration during the second. The narrow ration produced 7.6 per cent more milk fat, increased the fat test 0.17 per cent and the amount of milk 93.4 lbs., the live weight remaining about the same.

To test the relative feeding value of cotton-seed meal and linseed meal for milk production 5 cows in the early stages of lactation were fed 3 periods of 28 days each. During the first and third periods the rations consisted of 10 parts wheat bran, 10 parts cotton-seed meal, 5 parts corn meal, and 5 parts linseed meal. During the second period the grain ration was the same except that 10 parts of linseed meal were given and 5 parts only of cotton-seed meal. Each cow was fed 45 lbs. daily of corn silage. The results show that cotton-seed meal gave only slightly more returns than linseed meal. Notwithstanding the greater cost of linseed meal the author advises the use of small quantities on account of its tonic effect.

A ration containing one-third cotton-seed meal, supplemented with corn silage, produced no ill effects when fed to cows during the month preceding parturition and to heifers ranging from 6 to 18 months of age. Old pasteurized skim milk did not affect calves, except that when badly curdled it seemed to produce scours. Feeding skim milk soured with pure cultures of lactic-acid bacteria proved efficacious in checking calf scours.

Protein and total feed requirements for milch cows (abmelkkühe), J. Hansen (*Arb. Deut. Landw. Gesell., 1910, No. 171, pp. 157*).—A series of cooperative feeding experiments, along lines of work previously noted (E. S. R., 19, p. 976), with cows which are "milked off," i. e., mature cows which are to be fattened at the end of the lactation period.

It was found that for satisfactory milk production, accompanied by a gain in weight of the cows, an average ration for cows weighing about 1,000 kg. live weight should have a total starch value of from 14.3 to 14.4 kg., of which from 2.5 to 2.7 kg. should be protein. An increase of protein usually raised the milk yield and decreased the gain in weight. These proportions, however, must be varied to suit individual cows.

The "killing-out" system of dairying, J. J. W. Billingsley (*Wallaces' Farmer, 35 (1910), No. 8, p. 350*).—This is a discussion of the evil effects on the future of dairying by the "killing-out" system, practiced in many localities. This is similar to the "milking-off" system noted in the article above, dairymen purchasing cows of traders when fresh and when the milk fails to pay for their feed selling them for beef. By this system the cow dealer and dairyman make money, but as the calves are sold to the butcher, and every cow, no matter how valuable she might be as a breeder, is consigned to the shambles at a comparatively young age, the system is destined to retard progress in the future as compared with the breeding-up system, where the best cows are retained as breeders for several years.

Dairy herd records, J. H. Shepperd and W. B. Richards (*North Dakota Sta. Bul. 91, pp 129–168, pls. 6*).—This bulletin reports the records of the college herd from 1904 to 1910. The milk records of 24 cows consisting of pure bred and grade Holsteins and Jerseys, pure bred Red Polls, and 1 pure bred Shorthorn are given for the whole period, but the record of milk fat produced and feed consumed has been kept only since 1907.

The average amount of milk produced per cow per year for the whole period was 5,265.9 lbs. During the years 1908 and 1909 the averages for the herd were, milk 5,043.9 lbs., fat 206.8 lbs. at a cost of 16.1 cts. per pound, cost of feed $33.86, net profit $44.76. The largest net profit was $67.90 and the smallest $20.47. Tables are presented showing the records of the cows for their complete lactation periods. A description of each cow and photographs of most of them are included.

The composition of the milk of some breeds of Indian cows and buffaloes and its variations.—I, The milk of some breeds of Indian cows, A. A. Meggitt and H. H. Mann (*Mem. Dept. Agr. India, Chem. Ser., 2 (1911), No. 1,* *pp.* [illegible], *pls.* [illegible].—This contains data on the composition of the milk of cows belonging to the Sind and Gir breeds. The average figures for the fat content of the Gir breed were morning milk 5.2 per cent and evening milk 6.2 per cent, and for the Sind breed the corresponding figures were 6 and 6.3 per cent respectively. The factors affecting the yield and composition of the milk are discussed.

Progress of the dairy industry in Wisconsin, H. C. TAYLOR and C. E. LEE (*Wisconsin Sta. Bul. 210, pp. 3–30, pl. 1, maps 18*).—This bulletin reviews the progress made during the decade from 1900 to 1910 in the dairy industry, which it is stated has become the most important branch in agriculture in Wisconsin. The distribution of cows, the relative progress of the creamery, cheese, and condensing industries, the influence of quality of cream on the butter industry, and the division of territory between creameries and cheese factories are discussed and graphically represented by means of maps. Appendixes give statistics by counties of cheese factories, creameries, and skimming stations, and of creamery butter and factory cheese production.

The dairy industry in Hungary, C. GORINI (*Agr. Mod., 15 (1909), No. 32, pp. 436, 437; Bul. Mens. Off. Renseig. Agr. [Paris], 10 (1911), No. 3, pp. 313, 314; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, pp. 1102, 1103*).—A general and statistical article on the growth of the dairy industry in Hungary in recent years.

Dairy inspection in Bavaria, 1908–1910 (*Landw. Jahrb. Bayern, 1 (1911), No. 10, pp. 717–751*).—A brief report of the work of the dairy inspector of Bavaria in 1908, 1909, and 1910. It contains statistics and a discussion of the dairying industry in Bavaria.

Report of the experiment station and school for dairying at Wreschen, H. TIEMANN (*Ber. Vers. Stat. u. Lehranst. Molkw. Wreschen, 1910–11, pp. 16*).—A brief report of the work of the station, which consisted chiefly of trials of dairy apparatus and analytical work with milk and milk products.

Notices of Judgment (*U. S. Dept. Agr., Notices of Judgment 995, 1002, 1018, 1028, 1033, p. 1 each*).—These relate to the adulteration of powdered milk and the misbranding of condensed milk, butter, and cheese.

The hygienic value of milk in Portugal, A. PIRES DE LIMA (*O Valor hygienico do Leite do Porto. Inaug. Diss., Portugal, 1911, pp. 153, charts 6*).—A summary of investigations of the production and analysis of sanitary milk, together with a report of chemical constants and bacterial counts made of market milk obtained from different places in Portugal.

A bibliography is appended.

[Pasteurizing milk for children], R. HANNE (*Gsndhts. Ingen., 34 (1911), No 27, pp. 489–498, figs. 3*).—Successful trials are reported in pasteurizing milk after bottling with a new type of pasteurizer, which is illustrated and described.

Pasteurizing of children's milk, M. NEISSER (*Gsndhts. Ingen., 34 (1911), No. 37, pp. 690–693*).—A criticism of the method of pasteurizing noted above.

Care of milk (*Mo. Bul. N. Y. State Dept. Health, 27 (1911), No. 6; pp. 141–143*).—A compilation of data regarding the protection of milk in the dairy, during transportation, and in the home, particularly with reference to its use in infant feeding.

The importance of a certified or pasteurized butter, A. F. HESS (*Jour. Amer. Med. Assoc., 57 (1911), No. 7, pp. 561, 562*).—Inasmuch as cream contains a larger percentage of tubercle bacilli than the milk from which it is obtained, and the viability of bacilli even in salted butter has been demonstrated, it is urged that butter should be made of pasteurized cream. Although certified butter is considered the ideal product it is deemed out of the reach of the masses because of the extra cost.

Yeasty flavored butter, L. F. ROSENGREN, (*Meddel. Centralanst. Försöksv. Jordbruksområdet, 1911, No. 46, pp. 12; Nord. Mejeri Tidn., 26 (1911), No. 23, pp. 269, 270; N. Y. Produce Rev. and Amer. Cream., 32 (1911), No. 19, pp. 702–704*).—The author found that by overripening a starter contaminated with *Bacillus lactis acidi* (Leichmann) this species appears sooner or later accompanied by yeast fungi in greater or lesser quantities. The bacteria were thus considered not the direct cause of yeasty taste in butter, but indirectly in proportion as they favored the development of the yeast in the starter, the cream, and the butter. This apparently explains why a yeasty taste occurs in butter, where the ripening temperature usually is below 20° C., as although this is a temperature lower than that at which the long lactic-acid bacteria grow it is favorable to the yeast. Directions for handling the milk in order to prevent the defect are given.

Butter scoring contest for 1910, L. M. DAVIS (*California Sta. Circ. 60, pp. 2–27, figs. 2*).—This is the report of the second annual educational butter-scoring contest (E. S. R., 23, p. 283). The method of scoring the butter is noted and methods of making the highest and lowest scoring butters are described. Suggestions are offered for improving the quality of cream delivered at creameries, and notes are given on the efficiency of the cream cooler and the effect of insulating cream cans. A formula is given for calculating the overrun, together with directions for making the Babcock test for milk fat in butter.

"One of the most conspicuous features noticed in connection with the second contest, as well as the first, is the poor quality of cream which is generally received at California creameries."

Experiments in making cheese with pure cultures, O. GRATZ, (*Kisérlet. Közlem., 14 (1911), No. 3, pp. 418–432, fig. 1*).—In the manufacture of Óvár cheese the addition of from 0.5 to 2 per cent of the pure culture lactic-acid bacteria of the Streptococci group hastened ripening and improved the texture and flavor. Less than 0.5 per cent was without any appreciable effect. With cultures of *Bacillus casei* the characteristic flavor of the cheese was lost.

VETERINARY MEDICINE.

Handbook of comparative microscopic anatomy of domesticated animals, W. ELLENBERGER (*Handbuch der vergleichenden mikroskopischen Anatomie der Haustiere. Berlin, 1911, vol. 3, pp. XXI+556, figs. 493*).—In this third and final volume (E. S. R., 24, p. 777) the digestive system is dealt with by W. Ellenberger, the respiratory system by M. von Sussdorf, and the diaphragm and serosa by A. Trautmann.

In regard to the influence of bacterial toxins upon animal tissue, W. VIERHUFF (*Arch. Path. Anat. u. Physiol. [Virchow], 201 (1910), No. 3, pp. 419–427, pl. 1; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 9, p. 898*).—A description is given of the various histological changes which occur in the more important organs in acute and chronic poisoning by bacterial toxins. The action upon the kidney, suprarenals, spleen, lungs, and heart, and the local reaction are considered.

The distribution of hemolysins, agglutinins, and poisons in fungi, especially the Amanitas, the Entolomas, the Lactarius, and the Inocybes, W. W. FORD (*Jour. Pharmacol. and Expt. Ther., 2 (1911), No. 4, pp. 285–318*).—"The fungi which are known to be poisonous to man, such as *A. muscaria*, *A. phalloides*, *A. verna*, *A. virosa*, *L. torminosus*, *L. uvidus*, and *Clitocybe illudens*, are acutely poisonous to animals on subcutaneous inoculation, in but 2 instances, *L. uvidus* and *C. illudens*, this poisonous action being limited to guinea pigs.

"A number of other species, such as *A. chlorinosma*, *A. porphyria*, *A. morrissii*, *A. spreta*, *I. infelix*, and others, the properties of which have not apparently been tested, resemble the poisonous forms so closely in their action upon animals as to leave little doubt that their ingestion by man is likely to be followed by serious consequences.

"Certain genera, such as the Entolomas and the Hypholomas, exhibit a uniform toxicity for guinea pigs only (except *E. strictius*, which is poisonous also to rabbits). These genera include both edible and poisonous species, but no fatalities have thus far been reported from their consumption. Further experience must determine in how many of these species the poisonous substances found are harmful when taken into the intestinal tract of man.

"The fungi described in this paper which are known to be edible are either free from action upon both rabbits and guinea pigs or produce at times a chronic intoxication in guinea pigs only. A number of fungi whose properties are not described in the literature are without action upon animals. Those species are in all probability harmless to man.

"Poisonous fungi may be divided into 3 groups, (a) those containing poisons acting on the nerve centers, example, *A. muscaria;* (b) those producing degenerative changes in the internal organs, examples, *A. phalloides*, *A. verna*, etc.; (c) those causing gastro-intestinal disturbances of a more or less violent character, examples, *L. torminosus*, *C. illudens*, *E. sinuatum*, etc."

See also a previous note (E. S. R., 24, p. 384).

Leucoprotease and antileucoprotease, C. H. B. BRADLEY (*Jour. Hyg.* [*Cambridge*], *10* (*1910*), *No. 2, pp. 209–230, figs. 2; abs. in Jour. Chem. Soc.* [*London*], *98* (*1910*), *No. 577, I, pp. 795, 796*).—"Lymphoprotease is a pepsin-like enzym associated with mononuclear leucocytes. Leucoprotease is a trypsin-like enzym associated with polynuclear leucocytes, and was in the present experiments obtained from pus cells. Experiments on its rate of action are given. It acts only in neutral or faintly alkaline media. The antitryptic action of serum varies in different animals, and in the same animal under different conditions (disease, etc.). In the present experiments, the variation in mammals was slight, and immunization with leucoprotease caused only a small increase of antitryptic activity. Goats were the animals used."

[Diseases of domestic animals in Mexico] (*Estac. Agr. Cent.* [*Mexico*], *1909, Bols. 15, pp. 13, pls. 2, figs. 2; 21, pp. 12, pls. 3; 1910, Bols. 40, pp. 43, pl. 1, figs. 13; 42, pp. 27*).—In these bulletins E. L. Vallejo discusses bovine piroplasmosis, the affection of sheep due to *Oestrus ovis*, and liver rot in ruminants, and E. Fernandez an affection of equines, that occurs in the States of Tabasco, Chiapas, Vera Cruz, etc., and is caused by the bite of *Eurypelma longipes*.

Report of the territorial veterinarian, V. A. NORGAARD ([*Bien.*] *Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 1909–10, pp. 175–231, pls. 13*).—In this report on the details of the work accounts of the occurrence of stock disease are included. Reports of the assistant and deputy veterinarians are appended, the former giving accounts of investigations of redwater in cattle, eye worm in chickens, and sheep botflies in California rams on the island of Lanai.

Annual reports of proceedings under the diseases of animals acts, the markets and fairs (weighing of cattle) acts, etc., for the year 1910 (*Bd. Agr. and Fisheries* [*London*], [*Vet. Dept.*], *Ann. Rpts. Proc. 1910, pp. 108, pls. 2*).—The reports of the chief veterinary officer, S. Stockman (pp. 4–32), and of the assistant secretary animals division, A. W. Anstruther (pp. 33–50) include accounts of the occurrence of foot-and-mouth disease, hog cholera (swine fever), glanders, anthrax, sheep scab, a trypanosome of British cattle, bracken-poisoning, warbles, etc., and of the habits of *Hæmaphysalis punctata*. Plates showing the occurrence of hog cholera and sheep scab from 1908 to 1910 are included.

Various statistical data on the occurrence of diseases, international trade in animals, etc., are presented in an appendix.

In regard to the diagnosis of anthrax with the precipitation method, K. BIERBAUM (*Berlin. Tierärztl. Wchnschr., 27 (1911), No. 12, pp. 202–204*).—The results show that it is possible, as previously shown by Ascoli,[a] to detect anthrax after putrefaction has taken place and where the bacteriological examination has failed to reveal it.

Endemic Malta (Mediterranean) fever in Texas with the isolation of the Micrococcus melitensis from two patients, E. R. GENTRY and T. L. FERENBAUGH (*Jour. Amer. Med. Assoc., 57 (1911), No. 11, pp. 889–891, figs. 2*).—This is a report of a laboratory and clinical study of 2 cases of Malta fever in man, which had been previously noted (E. S. R., 25, p. 685), and which had entered on a relapse.

The organism isolated from the blood was found to agglutinate a specific serum in high dilution, to render milk alkaline, and not to ferment glucose. In practically all respects the organism resembled *M. melitensis*. The temperature charts, blood cell counts, and symptoms are given in detail.

The conclusion reached is that "endemic Malta fever exists in Texas at the present time."

Endemic Malta (Mediterranean) fever in Texas, E. R. GENTRY and T. L. FERENBAUGH (*Jour. Amer. Med. Assoc., 57 (1911), No. 13, pp. 1045–1048, figs. 3*).—Continuing previous work the authors report the clinical and laboratory findings with 5 new cases of Malta fever. In 2 of these cases goat's milk was not drunk at all, but the patients, who were children, played in dusty goat pens.

In addition, a bacteriological examination was made of some animals from a goat herd (9 angoras, 2 Spanish, and 12 Maltese female goats) from which the milk taken by some of the patients was obtained. The serum from 8 of these goats (34.7 per cent) agglutinated the *Micrococcus melitensis*. *M. melitensis* was not isolated from the goats.

[Endemic Malta (Mediterranean) fever in Texas], E. R. GENTRY and T. L. FERENBAUGH (*Jour. Amer. Med. Assoc., 57 (1911), No. 14, p. 1127*).—According to this report, 25 out of 128 goats taken from 3 herds which contained in all about 3,000 animals, gave a positive agglutination test for *Micrococcus melitensis*. "Only 8 of these had milk and they only in small quantity. Specimens of milk plated out on glucose-nutrose-litmus-agar gave a negative result for *M. melitensis* in each instance."

The results obtained by the intravenous injection of trypanblue in the plasmosis of domesticated animals with especial reference to gall sickness, G. T. HENDERSON (*Vet. Rec., 24 (1911), No. 1199, p. 4*).—The author reports 3 cases of gall sickness due to *Anaplasma marginale* and *Piroplasma mutans*, in which trypanblue was used with beneficial results. He states that he has found trypanblue to give highly successful results in all the piroplasmoses of domesticated animals other than that due to *P. parvum*.

The transmission of Spirochæta duttoni, E. HINDLE (*Parasitology, 4 (1911), No. 2, pp. 133–149*).—"About 30 per cent of the *Ornithodoros moubata* from Uganda have been found to be immune to infection with *Spirochæta duttoni*. . . .

"The spirochetal infection that may follow the bite of an infected *O. moubata* results from the entrance of the infective material, excreted by the tick whilst feeding, into the open wound caused by the tick's bite. It is not the result of the inoculation of infective material from the salivary glands."

Sleeping sickness and animal trypanosomiases in Senegal, A. THIROUX and L. D'ANFREVILLE DE LA SALLE (*La Maladie du Sommeil et les Trypanoso-*

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[a] Clin. Vet. [Milan], Sez. Prat., 33 (1910), No. 21, pp. 329–335; Ztschr. Infektionskrank. u. Hyg. Haustiere, 7 (1910), No. 5–6, pp. 375–379; Centbl. Bakt. [etc.], 1. Abt., Orig., 58 (1911), No. 1, pp. 63–70, figs. 2.

miases Animales au Sénégal. Paris, 1911, pp. VII+200, figs. 17).—Part 1 of this work (pp. 1–166) treats of sleeping sickness and part 2 (pp. 167–198) of the animal trypanosomiases occurring in Senegal. One chapter is devoted to the species of Glossina found in Senegal, their geographical distribution, habits, etc. The preface is by A. Laveran.

Strongyloides infections in man and animals in the Isthmian Canal Zone, S. T. Darling (*Jour. Expt. Med., 14 (1911), No. 1, pp. 1–24, pls. 3*).—"From a study of strongyloides infections in man and animals in this region, it has been determined, in confirmation of the views of Grassi, Calmette, and others, that they are not causative factors in the production of diarrhea. The mother worm, however, burrows into the mucosa and deposits her ova there. Certain tissue reactions take place and are evidenced by the cellular proliferation in those portions of the intestines occupied by the nematodes.

"In animals, there is an associated anemia, not positively attributable to the strongyloides, but, on the other hand, not attributable to any other cause. It is possible that *Strongyloides stercoralis* may cause some degree of anemia in man. The amount is indeterminable in this region among hospital cases on account of the associated hook-worm disease or malaria.

"Portals of entry for various microörganisms are made by the mother worm and her larvæ in the small intestine, and, while no case of general bacterial infection has been proved to have arisen in this way, its occurrence is possible and highly probable. . . .

"From a correlation of culture study with the results of a histological examination of the invaded mucosa, this explanation of the derivation of the two phases is suggested. The mother worm in the intestinal tract has two kinds of progeny; (*a*) those expelled into the crypts or lumen, and (*b*) those imbedded in the intestinal wall. One lot becomes larvæ of either the direct or indirect phase; the other lot of the opposite phase. It appears to me that the intraepithelial cell-developed larvæ furnish the direct phase, while the embryos expelled directly from the mother become the indirect phase larvæ. . . .

"Cold merely inhibits the development of the larvæ into either the filariform (direct) or into the sexually differentiated adults, and does not alter the anlage.

"The resistant as well as the infecting form is the filariform larva, and all chemical larvicides must be directed against this form. Thymol and an alkaline cresol resin soap were found to be effective larvicides for the filariform larvæ."

Two new strongyloides of the monkey and ant bear are described. Cultures of these nematodes show a predominance of the indirect mode of development.

Is lupus bovine tuberculosis? C. Engelbreth (*Monatsh. Prakt. Dermatol., 50 (1910), No. 6, pp. 247–252; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 47 (1910), No. 22–24, p. 707*).—Lupus in man is caused, according to this author, by the bovine type of bacillus.

Experimental infection of mammals, birds, and cold-blooded vertebrates by homogenous cultures of Koch's tubercle bacillus, F. Arloing (*Compt. Rend. Soc. Biol.* [*Paris*], *68 (1910), No. 14, pp. 701–703; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 47 (1910), No. 22–24, p. 714*).—The author tested the pathogenic action of the human type of tubercle bacillus cultivated deep in bouillon upon various kinds of animals, and found that in cultivating by such means the bacillus loses much of its virulence.

The following order of susceptibility was established for mammals, viz, bovines, sheep, goat, rabbit, and dog; for birds, the fowl and pigeon; and for cold-blooded vertebrates, the frog and fish. In the ruminants the severest pathological condition was found to occur in the lungs, while in the rabbit it was present in the liver and spleen. In the frog and fish the changes manifested themselves in the serous membranes. In the dog no macroscopical changes were visible.

The detection of tubercle bacilli by the antiformin-ligroin method, with particular reference to intestinal tuberculosis, H. Hall (*Über den Nachweis der Tuberkelbazillen durch das Antiformin-Ligroinverfahren unter besonderer Berücksichtigung der Darmtuberkulose. Inaug. Diss., Univ. Giessen, 1909, pp. 29; rev. in Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 7, pp. 218, 219*).—Haserodt's procedure was utilized in these tests, and with it the author determined that all bacilli which were contained in the feces of sheep, bovines, and dogs, with the exception of the tubercle bacillus, were dissolved. It is pointed out, however, that tubercle bacilli which had been exposed for 24 hours to a 15 per cent antiformin solution were not capable of producing tuberculosis in guinea pigs.

In regard to the diagnostic and prognostic value of Russo's methylene blue reaction for tuberculosis, J. von Szabóky (*Ztschr. Tuberkulose, 17 (1911), No. 3, pp. 261–267*).—According to Russo this reaction is as accurate as Ehrlich's diazo reaction and is less complicated. The test consists of adding from 4 to 5 drops of a 1 per cent methylene blue solution to from 4 to 5 cc. of urine. After shaking the mixture, if the reaction is positive the urine assumes an emerald-green color, but if negative it remains blue. The test was tried with 39 nontuberculous subjects and with 195 tuberculous patients, of whom 30 were in the first stages of the disease, 65 in the second, and 100 in the third.

From the tests the author concludes that the reaction is of very little value as a diagnostic agent, but that where the reaction is constantly present in pulmonary tuberculosis it indicates a bad prognosis. He considers it nearly as valuable as Ehrlich's diazo reaction, and believes that it would be advisable to introduce it in general practice on account of its simplicity. He does not consider the reaction a purely colorimetric one.

Tests in regard to the action of various tuberculins when given internally, T. Pfeiffer and J. Leyacker (*Wiener Klin. Wchnschr., 23 (1910), No. 50, pp. 1797–1799, fig. 1; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 13, p. 1101*).—Neither old nor new tuberculin nor other tuberculins (intubertoxyl capsules containing 0.002 cc. of old and 0.002 cc. of new tuberculin (Koch), 0.2 gm. of creosote carbonate, and 0.02 gm. of atoxyl phthisoremid capsules containing new tuberculin and tuberol) when given per os yielded any reactions typical of tuberculin.

Convenient table in the use of tuberculins, G. H. Kress (*Jour. Amer. Med. Assoc., 56 (1911), No. 17, pp. 1252, 1253*).—This is a table for calculating the dilution of tuberculins for proper dosage.

Anthrax and piroplasmosis in bovines, S. Galbusera (*Clin. Vet. [Milan], Sez. Prat., 33 (1910), No. 32, pp. 505–508; abs. Rev. Gén. Méd. Vét., 17 (1911), No. 202, pp. 579–580*).—The differentiation of anthrax and piroplasmosis in the cadaver is discussed, in view of the importance of distinguishing them in meat inspection work.

Actinomycosis in cows' udders, J. Riddoch (*Jour. Meat and Milk Hyg., 1 (1911), No. 6, pp. 323, 324, fig. 1*).—A brief account of a case of this affection.

On the action of Senecio alkaloids and the causation of the hepatic cirrhosis of cattle (Pictou, Molteno, or Winton disease), A. R. Cushny (*Jour. Pharmacol. and Expt. Ther., 2 (1911), No. 6, pp. 531–548*).—The author's experiments indicate that the alkaloids of *Senecio latifolius* are capable of producing the symptoms and lesions characteristic of this disease. His results seem to indicate that *S. jacobæa* is devoid of the properties of *S. latifolius* whether the plant is grown in England or in Canada. "This is however incompatible with the results of Gilruth and Pethick, who showed definitely that the disease in Canada and New Zealand is due to this species. The discrepancy between these results and mine may probably arise either from the plant from which my preparations were made having been collected at the wrong season, or possibly from the poisonous principle having undergone change into some inert form in the course of preparation or drying.

"*S. sylvaticus* collected in Yorkshire in August proved equally inactive. *S. vulgaris* or common groundsel collected in England and prepared in the same way proved poisonous, a cat which received the extract from 2 gm. of the dried plant dying in 10 days with symptoms resembling those arising from senecifoline, but with more marked diarrhea. The post-mortem findings were similar to those observed from senecifoline."

In regard to the enzym and streptococci content of milk obtained under aseptic conditions, W. RULLMANN (*Arch. Hyg., 73 (1910), No. 1, pp. 81–144*).—Out of 84 milks which were obtained under aseptic conditions 20 were found to be free from bacteria, and with a great many samples the number of organisms was from 2 to 5 germs per cubic centimeter.

The enzym content was determined in the 20 germ-free samples, and from this it could be noted that catalase, direct oxidase, peroxidase, Schardinger's enzym, and diastase are original constituents of milk, while reductase, hydrogenase, and salolase are of bacterial origin. In these tests it was often possible to detect strains of micrococci which were capable of producing reductase and catalase in sterile milk and at a temperature of 37° C. It was also noted that milks obtained from cows affected with mastitis contained a large amount of catalase, Schardinger's enzym, and reductase, and that Schardinger's reagent could be decolorized by artificially sterilized germ-free milk, though a much longer period of time was required than with ordinary milk. The author was also able to note that the teats on each side of the udder were intimately connected. When large amounts of leucocytes were present in the milk the acidity content of the milk was low, and a decrease of the bacterial content of milk took place when the milk was allowed to stand for a long period.

In regard to the mastitis problem, the author concludes that the Trommsdorff leucocyte test is of great value as a diagnostic agent, and where an unusually large sediment has been obtained in the centrifuge tube he recommends a microscopic examination for streptococci and also the inoculation of the sediment into bouillon. Ernst's tester for detecting mastitis, according to the author, is an efficient apparatus for the control of the disease in the barn and is easily handled.

In regard to the biology of the hog erysipelas bacillus and two organisms which are morphologically similar, SCHIPP (*Deut. Tierärztl. Wchnschr., 18 (1910), No. 8, pp. 113–117; abs. in Ztschr. Fleisch u. Milchhyg., 21 (1910), No. 1, pp. 20, 21*).—Two bacilli were isolated from a bovine (A) and from chickens (B), which closely resembled *Bacillus erysipelatis suis*. These were subjected to a biological examination (agglutination and opposite immunization), the results of which showed that the (B) bacillus was identical with the erysipelas bacillus. This bacillus, according to the author, had an increased virulence, and in this way was capable of producing a lethal infection in the fowl but when cultivated in the laboratory it lost much of its aggressiveness. On the other hand, like other erysipelas strains, it retained its toxicity for mice for a long period of time.

Murrina, a trypanosomal disease of equines in Panama, S. T. DARLING (*Jour. Infec. Diseases, 8 (1911), No. 4, pp. 467–485, fig. 1*).—This is a report of studies of the fatal type of equine trypanosomiasis known in Panama as "murrina" and "derrengadera," a preliminary account of which has been previously noted (E. S. R., 23, p. 486). It is stated that at least 23 animals were destroyed by this disease during the year prior to April, 1910.

"The chief distinguishing features of the disease are anemia, weakness, emaciation and edema, conjunctival ecchymoses, conjunctivitis, pyrexia, and some posteria paresis. The pathological findings are constant and characteristic: Splenic capsular ecchymoses; acute hemorrrhagic nephritis, with acute glomerulitis and petchiæ; hemorrhages in renal lymph nodes; epicardial and endocardial ecchymoses; and less constantly pleural, peritoneal, and conjunctival ecchymoses, and pleural effusion. The blood changes are those of anemia with lymphocytosis. There is much phagocytosis of blood pigment by endothelial cells of the liver and spleen.

"The disease is probably transmitted mechanically by flies through the broken skin of cuts and various wounds. Saddle horses were not infected, and there are no evidences that any animals were infected by means of Stomoxys or tabanids or by ticks or bats.

"The epidemic, which threatened to destroy several hundred mules and horses, has been controlled (there having been no new case in [illegible] months) by detection of infected animals, by means of daily routine temperature records throughout the corral, the microscopic examination of the blood of all animals having a temperature above 100° F., the isolation in screened stables of infected animals or suspects, and the sacrifice of all infected animals."

The probable mode of infection and the methods used in controlling an outbreak of equine trypanosomiasis (murrina) in the Panama Canal Zone, S. T. DARLING (*Parasitology, 4 (1911), No. 2, pp. 83–86*).—The information here presented is included in the account above noted.

Investigations of Beschälseuche, ZWICK and FISCHER (*Arb. K. Gsndhtsamt., 36 (1910), No. 1, pp. 1–103, figs. 22, charts 24; abs. in Sleeping Sickness Bur. [London] Bul., 3 (1911), No. 23, pp. 28–31*).—The authors point out that this disease of horses has been prevalent at times in Germany and other parts of Europe for the last 100 years. The following conclusions arrived at are based on examinations of 26 infected horses:

"Beschälseuche is caused by trypanosomes which in their essential characteristics correspond with *Trypanosoma equiperdum*. These trypanosomes are, like those of dourine, transmissible to small experimental animals, as well as to cats, dogs, and horses. They produce in these animals a disease picture which completely corresponds with that of artificially produced dourine. Sheep also have shown themselves susceptible to infection; on the other hand, several attempts made to infect a goat and a cow failed. Beschälseuche and dourine are essentially identical diseases. The trypanosomes in pregnant animals sick of Beschälseuche can pass from the mother to the young. Beschälseuche does not spread except by coitus; the transmission of the disease in natural conditions does not occur by intermediaries (biting flies). For demonstrations of the trypanosomes in horses suspected of the disease one may use, (1) the microscopical examination of the mucous membrane of the vagina and urethra, as well as of the fluid contents of the local skin swellings as soon as possible after their appearance, and moreover cultures in blood bouillon; (2) inoculation under the skin or the peritoneum of white mice, guinea pigs, rabbits, and dogs of the fluid contents of these specific skin swellings and, according to the size of the experimental animals, of larger or smaller quantities of defibrinated and centrifuged blood diluted with physiological salt solution. Agglutination and the fixation of complement are not, as far as observations go, suitable methods for diagnosis of Beschälseuche. The serum of a horse suffering from Beschälseuche and of 2 sheep artificially infected with Beschälseuche trypanosomes exercised a protective action in white mice, which was not, however, quite reliable against an otherwise lethal infection with the trypanosomes of Beschälseuche and dourine. This serum does not protect, however, against such an infection with nagana typanosomes.

"We often succeeded by means of a single injection of arsenophenylglycerin (1 cc. of a solution of 1:150 to 1:300) in permanently curing infected white mice; also in the case of rabbits and dogs favorable results were attained with the preparation. Our experiments and observations, as far as they have gone, are not yet sufficiently advanced for us to give an estimate of the action of the medicament in horses."

A bibliography of 79 titles is appended to the account.

In regard to the treatment of equine influenza, MINDER (*Schweiz. Arch. Tierheilk., 52 (1910), No. 5, pp. 340–350; abs. in Ztschr. Immunitätsf. u. Expt. Ther., II, Ref., 3 (1910), No. 8, p. 844*).—The author reports his results with a curative serum for equine pneumonia. This serum is produced with a view of having its action directed to both the pneumostreptococcus and the ovid bacterium (*Pasteurella equi*).

The results with 16 out of 17 horses were considered good.

Etiology of canine distemper, N. S. FERRY (*Jour. Infect. Diseases, 8 (1911), No. 4, pp. 399–420*).—"Canine distemper is found, as a result of this research, to be an acute infectious disease primarily of the respiratory tract of the young dog, caused by a micro-organism first described by me [E. S. R., 24, p. 285], to which I have given the name *Bacillus bronchicanis*.

"These assertions are based on the following facts:

"When cultures are taken early in the disease *B. bronchicanis* is found in the respiratory tract in every case, and, if taken in the first stage, is found uncontaminated. *B. bronchicanis* was isolated from 97 dogs at autopsy. In 68 cases it was isolated in pure culture either from the respiratory tract or blood. Of 29 positive blood cultures it was found 18 times, in 13 of which it was unaccompanied by any other organism. *B. bronchicanis* was isolated from the only case attempted during life, in the very earliest stage, by means of the bronchoscope. The serum from cases of distemper in all stages has given positive agglutination with *B. bronchicanis*, while the controls were invariably negative. Koch's law has been fulfilled and cases of typical distemper have been produced by artificial inoculation with pure cultures, the bacillus being again isolated and grown in pure culture, all under conditions which have precluded infection from any other source."

A list of 44 references is appended.

In regard to the results of vaccinating with Piorkowski's serum against canine distemper, BODEN (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 47, pp. 929–933*).—The author details his experience with Piorkowski's serum against canine distemper in 22 cases. As a result of his findings he believes the serum can only be employed to advantage in acute cases, or where a slight catarrh of the respiratory channels and the conjunctiva exists, and where a high initial fever exists or has existed.

Prophylaxis against echinococcus disease, P. BARABASCHI (*Gaz. Osped. e Clin. [Milan], 31 (1910), No. 116, pp. 1225–1227; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 6 (1911), No. 5, p. 202*).—The author injected increasing amounts of sterile echinococcus cystic fluid (from 3 to 60 cc.) into dogs, and later on gave them 400 living echinococcus heads. The dogs did not become sick, and after a period of 2½ months no parasite could be detected in the intestinal tract. As immunity against the disease can be conferred upon the young through the placenta, the author recommends the obligatory immunisation of female dogs against the disease.

A new species of cestode parasite (Tænia balaniceps) of the dog and of the lynx, with a note on Proteocephalus punicus, M. C. HALL (*Proc. U. S. Nat. Mus., 39 (1911), pp. 139–151, figs. 9*).—The species here described as new was taken from a dog from Fallen, Nev., and from a lynx (*Lynx rufus maculatus*) from southern New Mexico.

Scabies of the rabbit, W. Jowett (*Jour. Compar. Path. and Ther., 24 (1911), No. 2, pp. 134–136, figs. 2*).—The author records cases in which the trunks of rabbits were affected.

Tuberculosis in fowls (*Michigan Sta. Circ. 12, pp. 83–86, figs. 2*).—Attention is called to the importance of an early recognition of this disease, which has been found in flocks in several counties of Michigan and occasionally in market chickens. Mention is made of a large flock of mixed Black Minorcas and Brown Leghorns that was found in Livingston County, badly affected with tuberculosis. Attention is also directed to the fact that the tubercle bacillus has been found in the white of eggs of affected fowls and to the danger of infection in drawing the intestines and other viscera of diseased birds.

"When a positive diagnosis has been made, the best solution of the problem seems to be to kill the whole flock and use those not affected for food, burning the diseased ones. After this, a careful disinfection of the chicken house and yards is necessary before it is safe to introduce new birds. As a preventive may be recommended the exclusion of the disease by raising stock from eggs known to have come from healthy birds, and refusal to buy stock from poultrymen that can not offer evidence of flocks free from tuberculosis."

The infective granule in certain protozoal infections, as illustrated by the spirochetosis of Sudanese fowls, A. Balfour (*Brit. Med. Jour., 1911, No. 2622, p. 752*).—The author, working in Khartum, has found through use of the dark-field method, especially by practicing liver puncture on chicks at the crisis or on chicks which have been given a sufficiently large dose of "Salvarsan," that in the liver in particular, also in the spleen and lungs the causative agent of fowl spirochetosis undergoes a remarkable change. The spirochetes discharge spherical granules from their periplastic sheath which apparently enter the red cells, develop in them, and complete a cycle of schizogony. It is stated that Fry, who confirms the author's observations, "has previously seen a shedding-off of granules by trypanosomes in the peripheral blood of experimental animals." The author thinks that it is these spirochete granules in the liver, spleen, and lungs, and possibly also in other internal organs, that invade the red cells. "Such a chain of events fully explains all the puzzling features which this intracorpuscular infection has hitherto presented, and, moreover, brings it into line with the infective granules found in the ticks, for these very closely resemble those seen in liver juice films, both when examined by the dark-field method and when stained by the Levaditi process."

That these granules have not previously been observed is thought to be explained by the fact that they apparently do not take on the Romanowsky stain. The author's observations lead him to conclude that this fowl spirochete must be classed as a species, for which he proposes the name *Spirochæta granulosa penetrans*. Since these granules have been found to be resistant forms, it is thought that their presence in countless numbers in the tissues may explain part of the mechanism of relapse and the difficulty in curing completely some of the chronic, spirochetal infections, such as, for example, syphilis and yaws.

Feeding experiments in fowl spirochetosis, A. Balfour (*Lancet [London], 1911, II, No. 4, pp. 223, 224*).—In feeding experiments here reported, the author has found that "if healthy chicks be fed on ticks (*Argas persicus*), which themselves have recently fed on birds infected with *Spirochæta granulosa penetrans*, the fowl spirochete of the Soudan, the chicks speedily develop spirochetosis. Not only so, but if healthy chicks be fed on a sufficient number of ticks which, having fed a long time previously on spirochete infected birds, harbor, not spirochetes, but granules only, these chicks likewise become infected through the alimentary canal. In both cases the incubation period is short, in one instance it was very short, and it may be said that care was taken to exclude any other possible source of infection."

Further observations on the cecal parasites of fowls, with some reference to the rectal fauna of other vertebrates, C. H. MARTIN and MURIEL ROBERTSON (*Quart. Jour. Micros. Sci. [London], n. ser., 57 (1911), No. 225, pp. 53–81, pls. 5, figs. 4*).—The flagellates *Chilomastix gallinarum*, *Trichomonas gallinarum*, *T. eberthi*, and *Trichomastix gallinarum* are the species to which particular attention is given in this paper.

RURAL ECONOMICS.

Urban and rural population of the United States (*U. S. Dept. Com. and Labor, Bur. Census [Press Bul.], 1911, Aug. 21, folio*).—This is a preliminary statement issued by the Bureau of the Census showing comparative figures as to urban and rural population in the United States for the last 20 years. Urban population is defined as that residing in cities and other incorporated places of 2,500 inhabitants or more.

The proportion of total population living in urban and rural territory at the censuses of 1910, 1900, and 1890 is shown below:

Urban and rural population in the United States, 1890–1910.

Population	1910	1900	1890	1910	1900	1890
	Number.			Percentage distribution.		
Total.....	91,972,266	75,994,575	62,947,714	100.0	100.0	100.0
Urban.....	42,623,383	30 780,875	22 708,430	46 3	40.5	36.1
Rural.....	49,348,883	45,213,700	40,289,284	53.7	59.5	63.9

Of the total increase in population during the past decade about seven-tenths was in urban territory and three-tenths in rural territory. It is shown that in every State and Territory there has been since 1900 an increase in urban population, while in 7 States there has been an actual decrease in rural population. Urban population has increased faster than rural population in every State except Montana and Wyoming.

It is further pointed out that in no State or Territory was the increase in urban population less than 10 per cent. In 13 States it was between 50 and 100 per cent, and in 6 States more than 100 per cent. There were 22 States in which the rural population either decreased or showed an increase of less than 10 per cent, and only 8 States where there was an increase of more than 50 per cent.

Other tables are given showing the urban and rural population in the United States by States and Territories in 1890, 1900, and 1910.

South's marvellous agricultural progress (*Manfrs. Rec., 60 (1911), No. 5, pp. 45, 46*).—This article presents by notes, statistics, and illustrations the agricultural progress of the South from 1900 to 1910. Compared with the country as a whole the increases in certain farm lines are shown as follows:

Comparative value of farm lands, buildings, machinery, etc., in the South and in the United States.

	The South.			The United States.		
	1900	1910	Increase.	1900	1910	Increase.
			Per ct.			*Per ct.*
Farm lands, value.....	$2,388,593 000	$5,209,676,000	118	$13,051,033,000	$28,383,821,000	118
Farm buildings, value.	$685,188,000	$1,314,429,000	92	$3,556,614,000	$6,294,025,000	77
Machinery, etc., value.	$167,349,000	$262,090,000	57	$749,778,000	$1,261,817,000	68
Improved acreage.	116,781,000	131,958,000	13	414,490,000	477,424,000	15
Fertilizers, cost.....	$29,006,000	$74,703,000	157	$53,630,000	$114,273,000	113
Labor, cost.........	$81,781,000	$149,463,000	82	$357,393,000	$651,862,000	82

Additional tables are given showing the aggregate value of farm lands by States, also the value of farm buildings and farm machinery, improved acreage, expenditures for labor and fertilizers, the average value per acre of lands alone and the values of 12 leading crops in 1900 and 1910.

Yearbook, 1910 (*N. Dak. Mag., 4 (1911), No. 4, pp. 272, pl. 1, figs. [illegible]*).—This publication gives a historical and descriptive sketch of the State of North Dakota by counties, showing the agricultural, social, and political history of each, supplemented by statistics concerning their population, and the commercial, industrial, and agricultural growth during the past year.

[Agriculture in Canada], J. W. ROBERTSON ET AL. (In *Lands, Fisheries and Game, and Minerals. Ottawa: Com. Conserv., 1911, pp. 1–33*).—This report presents results of an agricultural survey of representative areas in each province, made by special agents of the Canadian government under the supervision of the officers of the provincial departments of agriculture and the agricultural colleges. Visits were made to 100 or more representative farms in each province and the information obtained is considered fairly representative of the actual conditions in each regarding the "preservation of soil fertility, the inroads of weeds and insect pests, and the practice of well-planned farming as shown by systematic rotation of crops, the practice of sowing selected seeds, and the application of manures or other fertilizers."

Tables are given showing the area of field crops, and the yield and value of farm products in the various provinces.

Conservation of the soil, W. H. TAFT (*U. S. Dept. Agr., Office Secretary Circ. 38, pp. 8*).—This is an address before the National Conservation Congress, at Kansas City, Mo., September 25, 1911, in which the present status of agriculture in this country is discussed, together with the outlook for future development along the lines of soil conservation, business administration, and agricultural education. It is believed that the adoption of improved methods will so stimulate production that "we may look forward to the middle of this century, when 200,000,000 of people shall swear fealty to the starry flag, as a time when America will still continue to feed her millions and feed them well out of her own soil."

The country-life movement, L. H. BAILEY (*New York, 1911, pp. XI+220*).—The author makes a careful distinction between the "country-life movement" and the "back-to-the-farm" agitation, showing that the former "is the working out of the desire to make rural civilization as effective as other civilization," and the latter is in part "the result of the doubtful propaganda to decrease the cost of living by sending more persons to the land, on the mostly mistaken assumption that more products will thereby be secured for the world's markets." A greater portion of the book is devoted to a discussion of some of the agencies for a more equal development of social and economic conditions in country and city life.

Bookkeeping for small farmers (*Jour. Bd. Agr. Brit. Guiana, 5 (1911), No. 1, pp. 21–23*).—A simple and practical method of farm bookkeeping for the small farmer is fully explained and illustrated.

The Bavarian Central Loan Bank (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel., 2 (1911), No. 6, pp. 12–14*).—This bank was founded in 1894 as a limited liability company to serve as a kind of clearing house for the Bavarian agricultural credit banks, which deposit with it their surplus funds and receive loans from it, thus preserving to some degree an equilibrium between societies with surplus funds and those in need of money. It deals entirely with the affiliated agricultural banks and by fixing practically a uniform rate of interest it prevents to a large extent its members from suffering by fluctuations in the market rate of discount.

In 1909 the Central Bank founded a special land purchase department to assist cooperative credit banks in buying and selling land. Up to the present time 85 peasant holdings have been bought and sold again by the Central and the local banks.

Agricultural statistics of Bulgaria (*Zeml. Statis.* (*Statis. Agr.*), *1909, pp. 76*).—This report gives tables showing the amount of cultivated land, the yield and estimated value of farm crops, live stock, etc., by departments and subdivisions during the year 1909.

Agricultural statistics of Bengal for 1909–10 (*Agr. Statis. Bengal, 1909–10, p. 77*).—Statistics are given showing the acreage, classification of areas, and status of irrigation, crops, current fallows, and stock in cadastrally-surveyed areas in Bengal, and the transfer of land in each district for the year ended with March, 1910.

Foreign crops, August, 1911, C. M. DAUGHERTY (*U. S. Dept. Agr., Bur. Statis. Circ. 23, pp. 14*).—This circular reports foreign crop conditions, giving comparative yields and estimated yields of the leading agricultural crops and products.

Legal weights (in pounds) per bushel of various commodities (*U. S. Dept. Com. and Labor, Bur. Standards Circ. 10, pp. 10*).—This circular shows the legal weights per bushel of various commodities as fixed by national or state legislation.

In many cases the weights of similar commodities differ considerably in different States. It is also pointed out that on account of variations in the densities of commodities in different localities and in different seasons, the weight of a given volume has only been approximately fixed for these commodities, so that in transactions involving the measure of such commodities it is important that it be distinctly understood whether the U. S. bushel, viz, the volume of 2,150.42 cu. in., or a certain fixed number of pounds is meant.

The circular recommends that all sales of agricultural commodities be made by weight.

AGRICULTURAL EDUCATION.

Addresses and proceedings of the National Education Association, Boston, Mass., 1910 (*Addresses and Proc. Nat. Ed. Assoc., 48 (1910), pp. XI+1124*).—The papers presented before the department of rural and agricultural education of the National Education Association at its convention in Boston, Mass., July 2–8, 1910, included the following:

Value of demonstrative methods in the agricultural education of the rural population, H. L. Russell (pp. 107–111).—The author holds that the economic need of the hour is increased production and that agricultural education should be extended to the man on the farm. The means employed at the University of Wisconsin are described.

Field laboratory work accompanying college courses in horticulture, R. L. Watts (pp. 1082–1087).—Some of the field laboratory work connected with the courses in horticulture as given at the Pennsylvania State College is outlined.

Field laboratory work, K. C. Davis (pp. 1087–1089).—The exercises which must be taken outside the school room and which have a most direct bearing on agriculture are grouped as those which deal with (1) soils, (2) plants, (3) animal life, and (4) machines, tools, and buildings. The exercises in field laboratory work at a well-established agricultural high school are given as an example of how the work may be accomplished elsewhere than on the school farm.

Laboratory and field work in the agricultural high school, B. H. Crocheron (pp. 1089–1093).—This paper discusses four difficulties encountered in attempting field and laboratory work in an agricultural high school. These difficulties are (1) lack of available information as to the best exercises, (2) lack of materials, (3) lack of time in which to prepare exercises for presentation, and (4) the difficulty in preserving the proper sequence so as to articulate with the text-book work. The community work which the Agricultural High School of Baltimore County, Md., is doing (E. S. R., 25, p. 598) is also described.

The place of agriculture in the public high schools, G. F. Warren (pp. 1094–1103).—The author discusses the question of how much education a farmer needs, citing the results obtained in the farm-management investigations in four New York townships previously noted (E. S. R., 25, p. 594), concluding that a high school education is worth more to these farmers than an endowment of $6,000 in 5 per cent bonds. Other subjects discussed are what schools and instructors should teach secondary agriculture, the place of agriculture in the high school course, and the object in so teaching it.

The place of the agricultural high school in the system of public education, D. J. Crosby (pp. 1103–1107).—This paper consists chiefly of a discussion of two things which seem to the author to be essential in a system of universal public education, viz: (1) A standard graded course of instruction leading from the kindergarten through the university to the learned, technical, and business professions, and (2) adequate provision for those who can not pursue the whole course, or who, for any reason whatever, have gotten out of the direct line of the standard course. A brief summary is given as to the influence of agricultural high schools and their place in a system of public secondary education.

How the schools and the United States Department of Agriculture can cooperate, W. M. Hays (pp. 1108–1113).—The major portion of this paper consists of an analysis of the existing secondary educational situation in order to give a viewpoint of the complex relationship of this Department to other educational institutions. There is also a brief review of what the Department is already doing along economic and educational lines.

Opportunities for graduate study in agriculture in the United States, A. C. Monahan (*Bur. of Ed.* [*U. S.*] *Bul. 2, 1911, pp. 16*).—This bulletin has been noted editorially (E. S. R. 25, p. 705).

[Agricultural and forestry education in Austria] (*Land u. Forstw. Unterrichts Ztg., 24* (*1910*), *No. 1-2, pp. V+147+LXIII*).—This report includes special articles on The Didactic and Pedagogical Trend of Natural Science Instruction in Agricultural Schools, by Josef Rösch; Commercial Instruction in Agricultural and Forestry Schools: The Present Social Pedagogical Agencies, by Ludwig Fleischner; This Year's Course of Study for Itinerant Agricultural Instructors in Eisenach, by Hans Albrecht; and statistical tables and other data relative to the organization, curriculum, attendance, graduates, etc., of the agricultural and forestry educational institutions in Austria.

The statistics show that in March, 1910, there were 214 agricultural and forestry educational institutions in Austria, an increase over 1909 of 1 farm school, 3 agricultural winter schools, and 4 domestic science schools. The 214 institutions include 1 agricultural high school, 2 agricultural high school sections, 3 agricultural academies, 1 brewing academy, 9 agricultural and 5 forestry high schools, 2 high schools for viticulture, fruit culture and horticulture, 42 farm schools or elementary agricultural schools with a one-year course, 85 agricultural winter schools, 11 elementary forestry schools, 21 dairy and housekeeping schools, 28 elementary special schools for horticulture, viticulture, fruit, vegetable, flax, hop, meadow, and alpine culture, and apiculture, and 2 brewing and 2 distillery schools.

[Agricultural and forestry education in Austria] (*Land u. Forstw. Unterrichts Ztg., 24 (1910), Nos. 3-4, pp. IV+149-311*).—This report includes among other data the following special articles: The Mutual Assistance of the School and Home in Agricultural School Life, by Franz Kozeschnik; Concerning the Education of the People Outside of School, by Ludwig Fleischner; The Introduction of Agricultural Courses into the Army; The Cultural Significance of Instruction in Home Economics, by Franz Brosch; The Text-book Question, by Ernst Vital; Concerning Several Public and Private Economic Problems of Forest Production, by Adolf Cieslar; The Determination of Subject-matter in Lower Forestry Instruction, by Karl Pusch; and Commercial Instruction in the Agricultural and Forestry Schools and Itinerant Domestic Science Schools in France, by Leopold Freih. v. Hennet.

Housekeeping instruction for girls in Prussia, L. AXT (*Monatsh. Landw., 4 (1911), No. 7, pp. 208-214*).—This is a discussion of the need of housekeeping instruction in Prussia, followed by a detailed account of the agencies by means of which this instruction is being given in rural communities, such as permanent agricultural housekeeping schools and itinerant courses, as well as the training of teachers for this work.

Instruction in the practical agricultural schools, J. J. BARNEDA (*Min. Agr. [Argentina], Div. Enseñanza Agr. [Pub.], 5. ser., 1910, No. 1, pp. 32*).—This is a detailed statement of the object of the practical schools of agriculture in Argentina, together with information concerning students, faculty, courses of study, methods of instruction, etc.

Carrying the message to the people, E. E. SPARKS (*Farmers' Nat. Cong. U. S. Proc., 30 (1910), pp. 55-58*) —The author outlines the various methods suggested by teachers and investigators to keep the boy and the girl on the farm and concludes that the solution of the problem lies in education. He reviews the differing requirements for country and city life, and states that whether the endeavor to teach agriculture in the public schools will be more than an attempt will depend upon the training of the teacher to teach the subject efficiently, upon convincing the teacher that the subject can be taught successfully, and upon providing the teacher with a more serviceable outfit than the text-book.

Elementary school agriculture, E. B. BABCOCK and C. A. STEBBINS (*New York, 1911, pp. 65, figs. 8*).—This is a teacher's manual to accompany Hilgard and Osterhout's Agriculture for Schools of the Pacific Slope (E. S. R., 25, p. 297). It contains suggestions for school gardens and also for the development of typical lessons. In connection with these suggestions there are directions for setting up and using apparatus and other illustrative material. Appendixes contain an outline of agriculture and nature study by groups, lists of plants requiring comparatively large amounts of water and comparatively little water, and lists of reference books and other publications.

The school garden in the course of study, E. B. BABCOCK and C. A. STEBBINS (*California Sta. Circ. 62, pp. 12*).—A progressive course in school garden work is outlined in the first half of this circular from the first to the eighth grade, with a group scheme for smaller schools. The balance of the circular presents a course of study in school gardening for the sixth, seventh, and eighth grades.

Boys' corn clubs and improved methods of corn growing, T. R. BRYANT (*Kentucky Sta. Bul. 153, pp. 3-15*).—This bulletin is designed to meet the needs not only of the members of the boys' agricultural clubs but also of farmers in general. A general outline is given for a proposed constitution and by-laws for boys' agricultural clubs and of the principal points to be considered by such clubs. A brief general discussion is included on fertilizers, the importance of good seed, how to select and preserve seed corn, the germination test, grading by the size of the grains, the preparation of the seed bed, planting and cultivation, judging corn, and the standard ear. There is also a corn score card, as adopted by the Kentucky corn growers' association and a list of bulletins of the Kentucky Station available for distribution.

How to make an observation hive, L. J. NICKELS (*California Sta. Circ. 63, pp. 13, figs. 4*).—The purpose of this circular is to aid the student to a better understanding of the colony life of honeybees as an example of perfected cooperation. An observation hive for schoolroom use is described and drawings and specifications are reproduced. A bibliography suggests publications of this Department on bee keeping, standard works, bee magazines, and popular works.

University Farm School, Davis, Cal. (*California Sta. Circ. 61, pp. 19, figs. 7*).—This is the 1911–12 announcement for the school.

Announcement of farmers' short courses for 1911 (*California Sta. Circ. 64, pp. 16*).—This is an announcement of farmers' short courses for 1911 at the University Farm, Davis, Cal.

MISCELLANEOUS.

Thirty-third and Thirty-fourth Annual Reports of Connecticut State Station, 1909–10 (*Connecticut State Sta. Rpt. 1909–10, pt. 12, pp. XX*).—These pages include the organization list; a report of the board of control, in which are embodied resolutions adopted regarding the life and work of the late S. W. Johnson, a former director of the station; a financial statement for the fiscal years ended September 30, 1909, and September 30, 1910; and a list of corrections to the report.

Twenty-third Annual Report of Louisiana Stations, 1910 (*Louisiana Stas. Rpt. 1910, pp. 27*).—This contains the organization list, a report of the director, and departmental reports on the work of each of the stations, lists of publications issued during the year, and a financial statement as to the federal funds for the fiscal year ended June 30, 1910, and as to the state funds for the fiscal year ended November 30, 1910.

Annual Report of Porto Rico Station, 1910 (*Porto Rico Sta. Rpt. 1910, pp. 44, pls. 4*).—This contains the organization list, a summary by the Special Agent in Charge of the investigations conducted at this station during the year, and separate reports by the physiologist, chemist, horticulturist, entomologist, pathologist, coffee expert, assistant horticulturist, and animal husbandman. The experimental work reported is for the most part abstracted elsewhere in this issue.

The report of the chemist includes analyses of soils from a citrus grove, goat manure, sheep manure, seaweed, cachasa (filter press residue), burnt lime, and disintegrated limestone, and data on an experiment showing an increased yield of sugar cane following the use of lime and a complete fertilizer.

Monthly Bulletin of the Department Library, July, 1911 (*U. S. Dept. Agr., Library Mo. Bul., 2 (1911), No. 7, pp. 187–206*).—This number contains data for July, 1911, as to the accessions to the Library of this Department and the additions to the list of periodicals currently received.

Changes in inspection laws (*Maine Sta. Off. Insp. 32, pp. 65–76*).—This publication points out the changes in and the chief requirements of the various Maine laws relating to the inspection of agricultural seeds, fertilizers, feeding stuffs, foods, drugs, fungicides, and insecticides as amended at the 1911 session of the legislature. Directions for sampling materials for free analysis by the station are appended.

NOTES.

Connecticut State Station.—The station has designed an educational exhibit to show the departments of work in which it is engaged, and also something of methods and results. The exhibit fills a tent 40 by 60 feet, owned by the station, and has been set up at five or six of the agricultural fairs in the State. Members of the station staff are in daily attendance to explain the exhibit and answer questions. All labels are printed, and special study has been given to make them as plain and instructive as possible. The exhibit has attracted much attention wherever shown.

Georgia College.—The last legislature increased the appropriation for extension work from $12,500 to $45,000 and the college maintenance fund by $10,000, making for the ensuing biennium an income of $250,000 for the furtherance of education in agriculture and extension teaching. It is hoped to inaugurate extension work on soils, organize breeding work with corn and cotton throughout the State, enlarge the work with boys and girls through the schools, foster animal and poultry husbandry through the establishment of special extension departments, and greatly enlarge the organization of itinerant schools of agriculture. The attendance in the college has increased in a gratifying manner.

An appropriation of $5,000 has been granted for the manufacture of hog cholera serum, of which $3,000 is for the equipment of the plant. The serum is to be sold by the state veterinarian at cost and the receipts revert back to the veterinary department of the college for subsequent maintenance.

Idaho University and Station.—The university has completed a live-stock judging pavilion for the use of classes in animal husbandry. This is a one-story structure, 36 by 60 feet, in mission style, with stucco finish on the outside, with raised seats, wide roomy space for live-stock specimens, and equipped with a heating plant, an office, and stall room for stock.

There has also been completed a modern dairy and live-stock barn for the use of the college and station. The main part of this barn has two floors, and is 48 by 66 feet in size, with a concrete silo 33 by 16 feet. There is also a wing for dairy stock 36 by 55 feet, provided with a milk room, an office, and complete equipment.

Recent appointments include the following: E. W. Hamilton as professor of agricultural engineering, Dr. E. T. Baker as professor of veterinary science, C. E. Temple as associate professor of agricultural botany and plant pathology, Cecil Starring as assistant in horticulture in the college and assistant horticulturist in the station, and C. V. Schrack, as gardener.

Purdue University.—A bequest to the school of agriculture of $50,000 and 1,500 acres of Minnesota land by the late William C. Smith, of Williamsport, Ind., is announced.

The entering class in agriculture is 137, a 20 per cent increase over last year and the largest in the history of the institution.

The farmers' short courses this year are to be shortened from a week to three days, and they are to be held in the smaller rural towns rather than in the larger cities, as in the past. Nearly 30 applications have already been received.

Iowa College and Station.—A two-story octagonal pavilion, 65 feet in diameter and of pressed brick, is being erected for the farm crops and animal husbandry laboratory work at an estimated cost of $15,000. It is to be connected with one of the other pavilions used for similar work.

H. B. Potter has resigned as assistant professor of farm crops to become associate editor of *Farm and Fireside*. H. B. Kinney has been appointed research laboratory assistant in soil chemistry.

Kentucky Station.—The foundation for an addition to the present station building, to cost $50,000, is under construction. This addition will be larger than the present structure but otherwise practically a duplication. The chemical laboratories and the bacteriological, food, and feedstuffs work will be located in the new portion when completed.

Massachusetts College.—Extension schools of agriculture and domestic science are announced for the first time. It is planned to hold not to exceed one in each county, each to last 5 days and local expenses to be met by the community.

The correspondence courses are proving increasingly successful and a course in shade-tree management is to be added. The college is again coöperating with the Springfield Y. M. C. A., which is arranging eight lecture courses in agriculture, horticulture, landscape gardening, beekeeping, poultry keeping, and dairying. The lectures are to be held in Springfield but the college furnishes all speakers.

Active coöperation has also been given to the first State corn show, which was recently held in Springfield and was very successful.

Minnesota University and Station.—According to the *University Farm Press News*, the Minnesota State Department of Public Instruction and the extension division of the university are cooperating in a systematic effort for the introduction of agriculture into the rural schools this year. A special monthly leaflet from the extension division, called *Rural School Agriculture*, is being sent to every rural school teacher in the State, with the idea of interesting thereby the boys and girls each month in those things which are being done on the farm and in the home during that month. Tests to be conducted at home and the reports brought to school for discussion are suggested.

D. A. Gaumnitz, assistant animal husbandman, and John Spencer, assistant in veterinary science and veterinarian, have resigned to engage in commercial work. R. H. Williams has been appointed assistant professor of animal husbandry in the university and assistant animal husbandman in the station. Dr. B. A. Beach, research assistant in veterinary science in the station, has resigned and is succeeded by Dr. W. L. Boyd. Johann Dittman has been appointed in charge of the denatured alcohol plant and William Underwood investigator in wood preservation. E. C. Huntington has resigned as editor in agricultural extension and farmers' institutes.

Missouri University and Station.—Two new buildings, a veterinary building and an implement building, have been added during the past summer. The veterinary building is a stone structure, three stories high, 120 feet long and 60 feet wide. It contains two large operating rooms, a dissecting room, a large lecture room, two large laboratories, and several smaller ones and offices. The implement building is 30 by 80 feet, and is divided into eight compartments.

The State Board of Horticulture is offering a prize of a $50 scholarship in the short course to the boy selecting and sending in the best half peck of apples, together with a paper setting forth why he chose the variety selected and what treatment the trees have received in the way of cultivation, spraying, pruning, etc. The fruit sent in will be kept in cold storage and later exhibited at fruit shows and expositions which may be held by the board. Similar prizes are also offered by the state fair management to the young men showing the greatest proficiency in judging live stock, corn, and poultry products at the fair.

An appropriation of $5,000 has been made by the state legislature for carrying on extension work.

Plans have been formulated for holding several branch short courses in agriculture at various points in the State during the coming winter. At each of these the college of agriculture will furnish two men who will give instruction in agriculture for five days. Local expenses are to be defrayed by the community and a guarantied attendance of at least 20 students will be required.

B. Szymoniak, a 1910 graduate of the university, has been appointed assistant in horticulture, and has entered upon his duties.

New Hampshire College and Station.—Beginning with November the extension department is planning to issue each week a press bulletin on some timely topic related to agriculture. These press bulletins will be sent to the station mailing lists within the State.

New Mexico College and Station.—J. H. Squires, J. E. Mundell, H. H. Schutz, and José Quintero have resigned to accept positions elsewhere. New appointments include the following assistants: R. L. Stewart and T. W. Conway in agronomy, J. W. Rigney and S. E. Merrell in horticulture, D. E. Merrill in entomology, and G. R. Quesenberry in animal husbandry. Dr. Eugene P. Humbert, associate biologist of the Maine Station, has been appointed agronomist.

Ohio State University.—Registration in the college of agriculture and domestic science has reached 863, making this the largest college in the university, with a gain of 281 over 1910

Oklahoma College and Station.—L. G. Griffin has succeeded Frank Ikard on the governing board. The position of assistant director of the station has been discontinued, and B. C. Pittuck has been made dean of all extension work of the college. Recent appointments include J. E. Payne, of the Colorado Station, to take charge of the Adams fund work in plant breeding for drought resistance at the Goodwell substation; A. A. Jones, of the Missouri University and Station, as assistant station chemist; T. E. McElroy, recently engaged in commercial work with insecticides, as assistant entomologist, vice A. L. Lovett, whose resignation has been recently noted; R. J. Clawson as assistant in zoology and veterinary science, vice W. S. Robbins, resigned to accept a similar position at the Michigan College and Station; and J. M. Cadwallader as assistant in dairying.

Oregon College and Station.—E. R. Stockwell has been appointed research assistant in dairy husbandry.

Pennsylvania College and Station.—Recent appointments include the following: Reginald R. Chaffee, of the Forest Service, as instructor in forestry, C. A. Smith and A. B. Werby as assistants in agricultural chemistry; W. R. White as instructor in agricultural education; Frank App as assistant in agronomy; and Ferdinand A. Varrelman as instructor in zoology.

Porto Rico University.—Dr. F. L. Stevens, of the North Carolina College and Station, has accepted the position of dean of the college of agriculture, and expects to begin its organization January 1, 1912. The establishment of a tropical botanical and zoological laboratory is contemplated in connection with the college.

Clemson College and Station.—W. R. Perkins, director of the department of agriculture of the college and professor of agronomy, resigned November 1 to take charge of a syndicate farm in Mississippi. C. S. Lykes is no longer connected with the station. L. D. Boone has been appointed assistant in chemistry.

Tennessee Station.—A special train has been sent out through east Tennessee, through the cooperation of the college and station, the state department of agriculture, the state board of health, and the Southern Railway Co. It contained four demonstration cars for live stock, agricultural and horticultural products, and exhibits relating to health and educational subjects. About 20 experts accompanied the train, and stops of one day each were made at about 30 different county seats.

Utah Station.—L. M. Winsor has been appointed assistant irrigation engineer.

West Virginia University.—A department of agricultural education has been established in the college of agriculture, with A. W. Nolan as associate professor of agricultural education at its head. It is planned, among other things, to publish (1) a monthly bulletin on school agriculture, (2) bulletins on nature study for teachers of grades below the seventh, and (3) to cooperate with the county superintendents and teachers in promoting boys' and girls' corn-growing contests.

C. R. Titlow, assistant in agricultural extension work at the Ohio State University, has been appointed director of agricultural extension, to take effect January 1, 1912.

Wisconsin University and Station.—The facilities of the poultry department have been increased by the construction of a fattening shed, 16 by 32 feet, which will be used in part for pen feeding and in part for crate fattening. For the present, work conducted in this building will be instructional in character, but it is hoped at a later date to take up experimental work. The department is also constructing 15 colony houses, which will be used for research work along the lines of breeding and nutrition.

Canadian Experimental Farms.—An additional farm has been established at Scott, Saskatchewan, in charge of R. E. Everest, and others at Kentville, Nova Scotia, and Wilmer, British Columbia. P. H. Moore has succeeded Thomas Sharp as superintendent of the farm at Agassiz, British Columbia, and W. C. McKillican has succeeded James Murray at Brandon, Manitoba. W. W. Thomson has been appointed assistant at Indian Head, Manitoba.

Porto Rico Board of Agriculture.—The Porto Rico Board of Agriculture was organized June 16 with headquarters at San Juan. Its contemplated duties are the inspection and quarantine of imports with a view to the exclusion of noxious pests, the introduction of beneficial birds, parasites, etc., the enforcement of protection for birds, and control regulations as to plant and animal pests, scientific work relating to these lines, and educational work, as by compiling and publishing data, preparing school exhibits, etc.

The construction of three fumigation houses has been authorized and W. V. Tower, of the Porto Rico Federal Station, appointed entomologist of the board to enforce the quarantine against importations, as previously noted. C. E. Hood, of the Bureau of Entomology of this Department, has been appointed to undertake the introduction into Porto Rico of natural enemies of the white grub. Arrangements are also being made for a survey of the birds and forestry resources of the island and of the measures advisable for their development and for the collection of agricultural statistics.

Agronomic-geological work in Germany.—At a recent meeting of the German Agricultural Council two addresses were delivered bearing on the present status of the geological-agronomical investigations in Germany and their application to agriculture. The sentiment of the meeting is summed up in the following recommendations, which were indorsed at the meeting.

(1) Soil studies, and other investigations the results of which may be influenced by the nature of the soil, should give attention to the soil profile and the underground geology.

(2) An early completion of the geological surveys on a scale of 1:25,000 is very urgent in all the German States in order that the present generation may receive the benefits therefrom.

(3) In addition to the general geological maps there should also be prepared smaller maps for use of state and agricultural societies, as well as for the benefit of estates.

(4) Schools of agriculture and forestry have a special obligation in the maintaining of courses of instruction in soils on a geological basis. Soil science should be taught by men well grounded in a knowledge of practical geology.

(5) It would be a grateful function of the agricultural societies to correlate farm practice with the teachings of the geological maps in order that their agricultural value might be enhanced.

Sixth National Dairy Show.—According to the *Breeder's Gazette*, "the magnitude and might of the Sixth National Dairy Show set a milestone in the progress of the industry." This show took place in the International Live Stock Exposition Amphitheater in Chicago, October 26 to November 4. Over 1,000 of the leading dairy breeds were shown. The exhibits of dairy machinery and appliances excelled those of previous years, and federal, state, and city governments were strongly represented as to their work in connection with the dairy industry. Unusual prominence was accorded the enterprise by the daily press of Chicago, and the attendance was gratifying as compared with previous years.

A noteworthy feature of the show was the attendance of the President of the United States, who gave a brief address in which he commended the scope and purpose of the enterprise and emphasized the necessity of adopting improved farming methods and breeding more efficient dairy stock as a means of keeping pace with the requirements of the increasing population. The President also offered a silver cup to the student making the highest score in the dairy stock judging contest, and presented this cup in person to the winner, Russell Jensen, of the South Dakota College.

The students' judging contest attracted much attention, teams from 10 institutions competing. As in previous years, valuable trophies and individual scholarships were offered by the various breeders' associations and others. The Kentucky University team won first place, with Ohio State University second, and South Dakota third. The Maryland College won first place in judging Ayrshires and Jerseys, and Kentucky on Guernseys and Holsteins.

First International Dairy Show.—This enterprise was held at Milwaukee October 10–18, with an excellent attendance throughout. The opening address was by Secretary Wilson of this Department.

Among the features of the show were the 500 entries of dairy stock, the extensive machinery exhibits, a model creamery operated by the Dairy Division of this Department, a cheese factory fitted up with modern machinery, the interstate butter contest, a demonstration herd showing groups of cattle fed in different ways, a child-welfare exhibit, and illustrative material from the Milwaukee Health Department and the University of Wisconsin. Among other awards were those to herdsmen for ability in fitting and showing cattle, neatness of person, and herd quarters.

Sixth International Dry-Farming Congress.—The Sixth Dry-Farming Congress was held at Colorado Springs, Colo., October 16–20, with a large and representative attendance, including delegates from Canada, Mexico, Central and South America, England, France, Germany, Austria, Russia, Africa, India, China, Japan, and Australia. A varied program was presented, including extensive exhibits of crops produced under dry-farming conditions.

The presidential address was given by President J. H. Worst, of the North Dakota College and Station, who advocated additional funds for the study of dry-farming methods. Other addresses were by H. L. Bolley, of the North Dakota College and Station, on flax as a dry-farming crop, and Director E. H. Webster, of the Kansas College and Station, who advocated a wider use of live stock and forage crops. President John A. Widtsoe, of the Utah College, was chosen president for next year, when the congress will be held at Lethbridge, Alberta.

The First International Congress of Farm Women was held in conjunction with the congress. Among the speakers was Mrs. Mary P. Van Zile, of the Kansas College, who discussed food values.

Farmers' National Congress.—At the thirty-first session of this organization, held at Columbus, Ohio, October 12–16, George M. Whitaker, of the Dairy Division of this Department, was elected president. Among the speakers were Assistant Secretary W. M. Hays, of this Department, on Possibilities of Advancement in American Agriculture; G. I. Christie, of Purdue University, on Extension Work of Agricultural Colleges; Acting Dean Vivian, of Ohio State University, on To What Extent have Agricultural Colleges improved Agriculture; C. S. Plumb on Animal Industry for Meat Supply; and Miss Ruth A. Wardall on Woman and the Home.

South American Congress of Agricultural Sciences.—Pursuant to a resolution of the International Scientific Congress, a South American Congress of Agricultural Sciences will be held in Buenos Aires in July, 1913. The organization of the congress is intrusted to the Argentine Rural Society, the National Society of Agricultural Engineers, and the National Schools of Agriculture of Buenos Aires and La Plata.

Agricultural Instruction in the Austrian Army.—The first attempt in Styria to give instruction in agriculture to soldiers was a course offered from November 16, 1910, to May 19, 1911, at Marburg. The instruction was given by two teachers of the Royal Fruit and Viticultural School. Forty hours were devoted to lectures at the barracks, and 8 hours to practical demonstrations on the school farm. Twenty-five soldiers voluntarily attended the course with great interest.

Miscellaneous.—The Rev. Henry C. McCook, LL. D., D. D., D. Sc., well known for his entomological writings, died October 31 at his home in Devon, Pa., at the age of 74 years. Dr. McCook was for many years an active member of the Philadelphia Academy of Natural Sciences, serving at one time as vice president. He also served as president of the American Entomological Society and was an honorary member of the British Museum. His principal entomological works are The Agricultural Ants of Texas, The Honey and Occident Ants, American Spiders and Their Spinning Work, and Tenants of an Old Farm.

Lord Carrington has retired as president of the Board of Agriculture and Fisheries in Great Britain, and has been succeeded by Walter Runciman, formerly minister for education. Lord Lucas becomes parliamentary secretary of agriculture in succession to Sir Edward Strachey.

Hon. Martin Burrell, who has been a practical fruit grower of British Columbia for several years, has been appointed minister of agriculture for the Dominion of Canada.

Dr. O. S. Morgan has been appointed professor of extension teaching in agriculture in Columbia University.

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EXPERIMENT STATION RECORD.

VOL. XXV. ABSTRACT NUMBER. No. 9.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Vegetable fats and oils, L. E. ANDÉS, trans. by C. SALTER (*London, Toronto, and New York, 1902, 2. ed., enl., pp. XVI+342, figs. 94*).—This publication, which deals with the practical preparation, purification, properties, adulteration, and examination of vegetable fats and oils, contains data as to the estimation of the amount of oil in seeds; the preparation of vegetable fats and oils; apparatus for grinding oil seeds and fruits; nondrying and drying vegetable oils; solid vegetable fats; seeds and fruits yielding oils and fats; soluble oils; improved methods of refining with sulphuric acid and zinc oxid or lead oxid, with caustic alkalis, ammonia, carbonates of the alkalis, and lime, or with tannin; Ekenberg's method of refining; Villon's process for purifying oils by sulphurous acid; mechanical appliances for refining; Filbert's deodorizing apparatus for oils and fats; bleaching fats and oils; practical experiments on the treatment of oils with regard to refining and bleaching; oil cake and oil meal; testing oils and fats; maize oil; fatty acids of coconut oil; and vegetable tallows from the Dutch East Indies.

Composition of rice oil, M. TSUJIMOTO (*Chem. Rev. Fett u. Harz Indus., 18 (1911), No. 5, pp. 111, 112; abs. in Ztschr. Angew. Chem., 24 (1911), No. 29, p. 1386*).—Rice oil is usually obtained by extracting rice bran with petroleum ether. It is fluid and has a greenish yellow color. The unsaponifiable part (4.78 per cent) is probably composed of phytosterin. The fatty acids are chiefly palmitic, oleic, and isoöleic acids, and if the amount of solid fatty acids is taken as 20 per cent, and the iodin number of the liquid acid as 130, they can be considered proportionately as follows: Palmitic acid 20 per cent, oleic acid 45 per cent, and isoöleic acid 35 per cent.

In regard to the refraction constants of vegetable oils, J. KLIMONT (*Ztschr. Angew. Chem., 24 (1911), No. 6, pp. 254–256*).—The oils examined were rape, cotton-seed, linseed, corn, olive, soy-bean, soy-bean in a mixture with cotton-seed, sesame, peanut, hedge mustard, and neats-foot oils, in regard to their density, refraction exponent, specific refraction, saponification number, iodin number, and middle molecular refraction. The work was done with particular reference to the last-named constant.

Reactions of carbohydrates.—I, Sucrose, C. REICHARD (*Pharm. Zentralhalle, 51 (1910), pp. 979–986; abs. in Jour. Chem. Soc. [London], 98 (1910), No. 578, II, p. 1117*).—This work with solid sucrose shows that in the cold, sulphuric acid, nitric acid, or hydrochloric acid convert this sugar into a pasty mass, which does not dry in the air. Carbonaceous matter produced with sulphuric acid did not separate until the mixture was heated.

The green coloration of copper sulphate in hydrochloric acid is retained much longer when sucrose is present, and it inhibits somewhat the precipitation produced by hydrochloric acid when added to mercurous nitrate. In the presence of hydrochloric acid sucrose yields a dark green coloration with potassium bichromate, a blue with ammonium molybdate, and a brown, which changes to violet, with ammonium vanadate. No coloration was produced with sodium tungstate or titanic acid in the presence of sulphuric acid. Sodium arsenate and hydrochloric acid together with sucrose produce a rose-red color. Of the colorations produced with organic bodies the most marked is the red with tannic acid in the presence of hydrochloric acid. Resorcin and hydrochloric acid gave a gooseberry-red color. The author points out the value of the last two and of the arsenic acid reaction for the detection of sucrose.

Behavior of humin in alkaline solutions of bromin, A. KONSCHEGG (*Ztschr. Physiol. Chem., 69 (1910), No. 5, pp. 390–394*).—Humin bodies were prepared by treating carbohydrates as follows:

Two hundred and fifty gm. of dextrose were heated for 12 hours with 1 liter of 24 per cent hydrochloric acid solution, the latter being repeatedly evaporated off and replenished. The resulting dark brown brittle mass was extracted with potassium hydrate, it being only partly soluble. The resulting filtered brown solution when treated with dilute hydrochloric acid yielded a brown flocculent precipitate. This precipitate was considered humic acid, and the portion insoluble in potassium hydrate, humin.

The insoluble humin when repeatedly treated with a warm potassium hydrate solution was converted into a slimy, tough mass. This mass was repeatedly washed with water to remove the alkali, and dried at 100° C. to a hard, vitreous-like brittle mass, which when ground yielded a brown powder insoluble in water, alkali solutions, acids, ether, and alcohol. It was, however, found to be soluble in an alkaline bromin solution, but only when the mass was mixed with the potassium hydrate solution first and bromin added slowly afterwards. After a time some white flocculent matter was precipitated. The same kind of precipitate was also obtained from the humic acid, and when examined under the microscope was found to be crystalline in structure. It was readily soluble in ether. The crystals were finally obtained in a pure state, and were found to possess a melting point of 92°, to be readily soluble in ether, acetone, and chloroform, and to have a camphor-like irritating odor. On the basis of analysis the author believes it to be tetrabrommethan.

This work indicates that carbohydrates are not totally decomposed by the action of acids.

A study of the lignocellulose of timothy hay, G. C. GIVEN (*Pennsylvania Sta. Rpt. 1910, pp. 248–254*).—The lignic acid, so-called, present in timothy hay (*Phleum pratense*), was found to resemble the lignone which has been obtained from jute and the lignin obtained by Browne (E. S. R., 16, p. 440) from sugar-cane fiber. It had a dark brown color and a vanillin-like odor. It was found to have an active carbonyl of ketone nature and an active carboxyl group, as evidenced by the fact that the precipitate gave reactions with semi-carbazid and with nitrate of silver. Aldehyde could not be obtained with Schiff's reagent. It was not determined whether the body belonged to the hexene series, in which it was placed by Cross and Bevan, but if so the author suggests that it has one or more side chains in view of its behavior with potassium permanganate. An elementary analysis of the lignin precipitate gave a formula corresponding to $C_{20}H_{24}O_{8}$.

Cellulose when prepared by the usual methods was found to contain much oxycellulose. Phlein, the inulin-like body observed by Ekstrand and Johanson in the nodules of timothy hay, could not be noted by the author in a watery extract of the hay.

The production of acetic and formic acid by hydrolyzing substances containing lignin, W. E. Cross (*Ber. Deut. Chem. Gesell.*, *43* (*1910*), *No. 8*, *pp. 1526–1528; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl.*, *21* (*1911*), *No. 11*, *p. 679*).—By hydrolyzing jute, wood, or straw, etc., with a 1 per cent sulphuric-acid solution at 110° C., evaporating the extract neutralized with calcium carbonate in a vacuum, and distilling in a stream of steam, from 1.2 to 2.8 per cent of acids (acetic and formic) are obtained. From pine wood the proportions were 4 parts of acetic to 1 part of formic acid. The acids did not originate from the cellulose, and according to the author lignin is the probable source.

"Sugar sand" from maple sap; a source of malic acid, W. H. Warren (*Jour. Amer. Chem. Soc.*, *33* (*1911*), *No. 7*, *pp. 1205–1211*).—Maple sap from *Acer saccharum*, when evaporated, deposits a variable quantity of the calcium salt of malic acid, which goes under the name of either niter or sugar sand. With care, from 16 to 25 lbs. of this substance can be obtained from about 1,000 trees per season. While this substance has already been examined by others (E. S. R., 12, p. 78), the author points out that the results were obtained with material which was not exactly typical. The analysis which follows is said to represent within narrow limits the quantities of the several constituents which this by-product may be expected to contain: Silica 7.74, phosphoric acid 0.05, ferric oxid 0.39, calcium 17.16, magnesium 0.03, moisture 2.6, malic acid 51.48, invert sugar 2.31, cane sugar 3.46, ether soluble matter 0.37, carbon dioxid 0.66, extraneous organic matter 2.35, undetermined (by difference) 11.4 per cent.

A method for obtaining malic acid is appended.

In regard to the fixation of lactic acid by casein, W. Van Dam (*Chem. Weekbl.*, *7* (*1910*), *No. 49*, *pp. 1013–1019*).—The author in this work determined the variation in the hydrogen ion concentration of lactic acid caused by the addition of casein. When a twentieth-normal solution of lactic acid was employed for varying quantities of casein at a temperature of 18° C., it was noted that as long as an excess of hydrogen ions was present in the solution the amount of lactic acid bound was constant. With very large quantities of casein, however, this relation was destroyed, and the amount of acid bound was very much less.

Protective enzyms [in fruits], M. T. Cook et al. (*Science, n. ser.*, *33* (*1911*), *No. 851*, *pp. 624–629*).—In this preliminary paper the authors point out "that there exists in the normal living fruit two enzyms, a catalase and an oxidase.

"The latter is probably most abundant in the early part of the season, gradually decreasing in activity as the fruit approaches maturity and ripens. Furthermore, from the results it appears that tannin as such does not exist in any part of the normal, uninjured fruit previous to maturity, except possibly a small amount in the peel, but exists as a poly-atomic phenol, which upon injury is acted upon by the oxidase and forms a tannin or tannin-like body having the property of precipitating proteid matter, and at the same time forming a germicidal fluid. This oxidase acts only in an acid solution and when present in an amount above a certain undetermined minimum. The above conditions are always present in normal immature pomaceous fruits. When normal, immature fruits are subjected to injury by fungi, insects, or mechanical agencies, the action of the oxidase on poly-atomic phenols is brought about with the effects as stated above."

Tests with the diastase of Aspergillus oryzæ, F. Münter (*Landw. Jahrb.*, *39* (*1910*), *Ergänzungsb. 3*, *pp. 298–314*).—The results of this work show that (1) alcohol and ether destroy the activity of this enzym; (2) ammonium sulphate is the only substance with which this enzym can be salted out (potassium chlorid, potassium sulphate, sodium chlorid, sodium sulphate, sodium phosphate, potassium phosphate, ammonium nitrate, magnesium chlorid, magnesium sulphate, calcium nitrate, and zinc sulphate could not be used); (3) the nitrogen content of the various precipitates is no criterion in regard to the activity; (4) no diastatic enzym could be separated by dialyzing through parchment paper; (5) small additions of sugar to enzym solutions have no effect upon the hydrolytic process, but a large amount of maltose (saccharification products), on the other hand, inhibits the process; (6) the optimum and lethal temperatures of diastase of different origins are different; (7) the diastatic capacity of diastase which has been weakened by heat can be increased by certain additions, such as sodium chlorid and egg white, peptone, or asparagin; and (8) the Hamburg and Fränkel chemical-biological method for the precipitation of diastases is not efficient.

Modification of the diphenylamin test for nitrous and nitric acids, W. A. WITHERS and B. J. RAY (*North Carolina Sta. Rpt. 1910, pp. 56–58*).—Combining some of the features of the different methods the authors have prepared a reagent which in their hands has proved to be very delicate. It is made as follows:

"Seven hundred mg. of diphenylamin are dissolved in a mixture of 60 cc. of concentrated sulphuric acid and 28.8 cc. of distilled water. The resulting mixture is thoroughly cooled and 11.3 cc. of concentrated hydrochloric acid (specific gravity 1.19) are added slowly—making the hydrochloric acid content 5 per cent. After standing over night some of the base separates showing that the reagent is saturated. The test with the diphenylamin reagent as prepared by [the authors] is conducted as follows: Place 1 cc. of the liquid to be tested in a clean test tube; add 1 drop of the diphenylamin reagent and mix thoroughly by shaking. From a pipette is added 2 cc. of concentrated sulphuric acid, while the tube is held at an angle so as to form 2 layers of the liquids. The tube is gently agitated so as to cause a slight mixing of the liquids at the plane of contact, and it is then placed in a bath at the temperature of 40° and left for 15 or 20 minutes. This method will reveal the presence of 1 part of nitrite nitrogen in 25,000,000 or 1 part of nitrate nitrogen in 35,000,000. By heating for 1 hour instead of 15 or 20 minutes the test will show 1 part of nitrite nitrogen in 32,000,000 or 1 part of nitrate nitrogen in 44,000,000."

Test for nitric acid, F. KLEIN (*Jour. Indus. and Engin. Chem., 2 (1910), No. 9, p. 389; abs. in Jour. Soc. Chem. Indus., 29 (1910), No. 20, p. 1200*).—The reagent used in this test is made by adding a little powdered tellurium to from 2 to 3 cc. of fuming sulphuric acid, and then from 1 to 2 cc. of 95 per cent sulphuric acid.

When a little of a nitrate or strong nitric acid is added to the reagent and heated, the eosin-red color which the reagent possesses is discharged. When dilute nitric acid (less than 40 per cent) is present, it is neutralized and the solution is evaporated to dryness before the test is complete. It was found that a solution consisting of 0.1 gm. of tellurium in 10 cc. of fuming sulphuric acid and 10 cc. of 95 per cent sulphuric acid is decolorized by 0.66 gm. of 66 per cent nitric acid.

The use of the above principle as a basis for quantitative colorimetric tests is pointed out.

New method for the rapid determination of nitrate nitrogen, A. QUARTAROLI (*Staz. Sper. Agr. Ital., 44 (1911), No. 2, pp. 157–164; abs. in Chem. Zentbl., 1911, II, No. 1, pp. 49, 50; Jour. Soc. Chem. Indus., 30 (1911), No. 14, p. 926*).—

The method has for its principle the interaction of nitrates and anhydrous formic acid, and proceeds according to the following equation:

$$2KNO_3+6H.CO_2H=N_2O+4CO_2+5H_2O+2H.CO_2K.$$

Analysis of calcium cyanamid, A. Stutzer (*Chem. Ztg., 35 (1911), No. 76, p. 694; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 14, p. 912*).—The results of determining the total nitrogen in calcium cyanamid by the Kjeldahl method were found to agree well with those obtained by the salicylic acid method. This is contrary to Monnier's findings, who obtained results 1 per cent too low with the former method. Only 0.14 per cent of nitrogen instead of 1.52 per cent, as stated by Monnier, was found to be derived from the carbon used in the manufacturing process.

The use of silver phosphate as a standard for phosphoric acid, and a critical study of the gravimetric magnesium method for the estimation of phosphoric acid, W. C. Dumas (*Chem. Engin., 12 (1910), No. 6, pp. 185–190, fig. 1; abs. in Chem. Ztg., 35 (1911), No. 18, Repert., p. 65*).—As the controlling substances of these determinations the author utilized silver phosphate, and as a result of the work he points out that the composition of magnesium ammonium phosphate may vary to a considerable extent. The proper composition, however, may be obtained when the precipitation is made from a neutral solution. The precipitate obtained from a weakly alkaline solution was found to be high in phosphoric acid and low in magnesium; some of the phosphoric acid is volatilized on ignition. In rapidly precipitating from a neutral or slightly alkaline solution the phosphoric acid content of the precipitate is low and the magnesium high. Magnesium pyrophosphate must be heated for at least ½ hour. Magnesium ammonium phosphate loses water and ammonia at 100° C.

Detection of arsenic acid in the presence of phosphoric acid, G. Madera (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 19 (1910), II, No. 2, pp. 68, 69; abs. in Chem. Zentbl., 1910, II, No. 12, p. 913*).—To a slightly acid boiling solution of the alkali salts of both of the above-named acids add from 10 to 15 cc. of a concentrated solution of ammonium nitrate and about 1 gm. of solid ammonium molybdate. After the ammonium molybdate is dissolved, boil for another 1½ minutes. The formation of a white precipitate indicates the presence of arsenic acid. Where much arsenic acid is present the precipitate is thrown down at once, but with smaller amounts boiling for a longer period is necessary.

Investigations on the estimation of inorganic phosphorus in animal tissues, A. C. Whittier (*Jour. Indus. and Engin. Chem., 3 (1911), No. 4, pp. 248–250*).—Considerable difficulty was experienced in this work in obtaining concordant results with the barium method (E. S. R., 17, p. 635), owing to the fact that the solution as obtained was, in most instances, cloudy. Where the solutions were clear, or the extracts were first coagulated, the results were fairly concordant with those obtained by the magnesium method (E. S. R., 23, p. 303). In most instances, however, the results for organic phosphorus were high. This difference in result the author does not believe is due to a hydrolysis of the organic into the inorganic state, but rather to the fact that a better precipitation takes place when the solutions are clear. Enzyms and the bacteria, according to the author, "seem to exert more of a hydrolyzing influence on organic phosphorus compounds of animal tissues than does boiling." The heating of flesh extracts has a tendency to check the activities of such organisms.

A study in the determination of calcium, G. HEISE (*Proc. Iowa Acad. Sci., 17 (1910), pp. 135–138*).—This work had for its purpose the simplification of the gravimetric determination of calcium. The author points out that the precipitation of calcium as oxalate and its subsequent conversion into oxid by heating presents many difficulties and liability to inaccuracies to the inexperienced analyst. Tests were therefore conducted in order to determine if calcium could be estimated by weighing it directly as calcium oxalate.

The author concludes as follows: "Calcium can be determined and accurately weighed as the oxalate. It can be very conveniently converted into the carbonate and weighed as such. The determinations can be carried out in porcelain crucibles without appreciable error. Either of the above mentioned methods is fully as accurate as the determination of calcium as the oxid and is much more convenient and rapid. Of the 2 methods, the determination as carbonate is somewhat superior to the determination as oxalate, because of the hydroscopic nature of the latter substance."

Methods of determining the dry-matter content of roots, R. K. KRISTENSEN (*Tidsskr. Landbr. Planteavl, 18 (1911), No. 1, pp. 96–108, figs. 5*).—Comparative results obtained with a disc beet sampler and a Helweg "beet saw" showed that the latter gave the more satisfactory and correct results.

In order to ascertain the degree of accuracy that can be reached in determining the dry-matter content of roots, 60 samples of mangels were taken from the same lot of roots, triplicate determinations being made in all cases. The dry-matter content was found to vary between 13.67 and 15.59 per cent, with an average of 14.60 per cent. The largest deviation from this percentage was 0.99 per cent. The average analytical error was 0.36 per cent. As a rule, the error in an ordinary, well-conducted analysis will not exceed 0.3 per cent, and in most cases is below 0.2 per cent of dry matter.

Estimation of the doughing value of flour, A. A. BESSON (*Chem. Ztg., 35 (1911), No. 28, pp. 245, 246; abs. in Analyst, 36 (1911), No. 422, p. 216*).—The author found that of the 2 methods proposed by Arragon, that by adding water to a definite amount of flour was the best. He endeavored to standardize the method and to eliminate the sources of error, if possible. It was found that a high result is obtained if all the water is added to the flour at one time, but that when added gradually the results were low.

The author, therefore, recommends adding at once 50 per cent of water to 150 or 200 gm. of the flour in a porcelain dish. The dough is then made as stiff as possible by working it with a glass rod. Strong kneading with the palm of the hand is absoultely necessary, and during the process the dough is squeezed between the fingers and pressed tightly against the palm. More water is then introduced during the process to obtain a uniformly wetted dough. The doughing is complete when it no longer sticks to the fingers, and the dough is then scraped together with the spatula and weighed.

These tests should agree within 1 per cent of added water, but allowance must be made for the moisture originally present in the flour, and the results reported in terms of dry substance.

A new method for the quantitative estimation of saccharose in the presence of other sugars, A. JOLLES (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 10, pp. 631–638*).—This method has been previously described (E. S. R., 24, p. 704), and comments thereon noted (E. S. R., 25, p. 412).

Contribution to the examination of molasses, A. JOLLES (*Osterr. Ungar. Ztschr. Zuckerindus. u. Landw., 39 (1910), No. 5, pp. 698–703*).—The author has modified a method previously noted (E. S. R., 24, p. 704) in order to apply it to the analysis of molasses. The results for sucrose, raffinose, and invert sugar obtained with the method were satisfactory.

In regard to apple marmalade and jelly, H. PELLET (*Monit. Sci., 4. ser., 24 (1910), II, No. 828, pp. 777–784; abs. in Ann. Falsif., 4 (1911), No. 29, p. 163*).—The author criticizes the work of Chauvin (E. S. R., 23, p. 167) in regard to the use of Clerget's method for determining sucrose, levulose, glucose, and invert sugar (inverted by the acid present in the apple), and states that the conclusions drawn by this author are diametrically opposed to the results obtained by himself and others.

He concludes that dextrin is not attacked by a 10 per cent solution of hydrochloric acid and thus has no influence upon the results obtained with the Clerget test. Furthermore, a mixture consisting of 75 gm. of sugar and 5 gm. of dextrin in 100 cc. of water acidified with tartaric acid will give exact results for sugar, while dextrin is not affected when heated to 95° C. for 15 minutes or at 100° C. for 15 minutes, nor when heated while exposed to the atmosphere. Such a mixture shows a boiling point of 115° C. Prolonged heating of solutions of this composition with 10 per cent hydrochloric acid at from 80 to 82° C. for 3 hours showed a complete inversion of the dextrin. The plane of rotation of the invert sugar turned to the right, but the reducing power did not vary much from that in the solution in which tartaric acid was used.

Experiments with yeast yielded the same results.

Detection of fusel oil in brandy, E. HERZOG (*Ztschr. Untersuch. Nahr. u. Genussmtl., 21 (1911), No. 5, pp. 280–282*).—The author points out that Holländer's reaction (E. S. R., 23, p. 216) is due to the co-presence of furfurol with the fusel oil in brandy. He considers it a furfurol reaction because no emerald-green coloration could be obtained with an alcoholic solution of fusel oil. Benzaldehyde, oil of fennel, and oil of cinnamon give a similar reaction with Holländer's reagent.

Determination of lactose in milk, VITOUX (*Ann. Falsif., 3 (1910), No. 25, pp. 471, 472*).—The author points out that practically the same results can be obtained by the French official and Denigès methods. The latter method is preferred for milks preserved with potassium bichromate. Both methods are given in detail.

On the peroxydase of cows' milk and its detection by means of the paraphenylendiamin test, E. NICOLAS (*Bul. Soc. Chim. France, 4. ser., 9 (1911), No. 6, pp. 266–269*).—In this work it is pointed out that while precipitated and boiled casein will give a reaction (blue coloration) with paraphenylendiamin and hydrogen peroxid, it is the latter which first acts with the paraphenylendiamin, and that the casein only subsequently combines with it in order to give the blue coloration. The reaction, furthermore, takes place only when hydrogen peroxid and paraphenylendiamin are present in concentrated solutions. In dilute solutions the reaction appears only when a little bran is added.

The above findings are contrary to those obtained by Bordas and Touplain (E. S. R., 23, p. 417).

Refractometric milk examination, G. KÜHN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 20 (1910), No. 9, pp. 575–579*).—The author points out the accuracy with which water can be detected with the Ackermann method (E. S. R., 25, p. 207) using numerous samples of commercial milks and the corresponding barn samples. In practically all instances conviction was obtained on the basis of the refractometric test.

In regard to the origin of ammonia in milk, L. MARCAS and C. HUYGE (*Rev. Gén. Lait, 8 (1911), No. 21, pp. 481–486*).—The authors, using Trillat and Sauton's test (E. S. R., 17, p. 287), examined commercial milks in different parts of France in order to determine the frequency of the occurrence of ammonia in milk. From their work they conclude that the presence of ammonia in milk is always an indication that it has been kept under unhygienic conditions or has been watered. On the other hand, they show that the absence of ammonia in milk does not always indicate that the milk has not been watered or has been properly cared for.

Commercial tests for moisture in butter, C. W. LARSON (*Pennsylvania Sta. Rpt. 1910, pp. 147–155, pls. 5*).—This is a study of the relative value of the several commercial moisture tests for butter thus far proposed (the Wagner-Gray, Irish, Wisconsin-high-pressure-oven, Ames-paraffin, and Marshall tests) as compared with the official gravimetric method.

"The results obtained from Wagner's moisture test are not always accurate. Very accurate results can be obtained with the Wisconsin high pressure oven, the Ames, and the Marshall tests, and if care is taken in the heating of the cup in the Irish test good results can be secured." . . .

Observations on some methods of estimating coconut oil and butter in butter and margarin, C. REVIS and E. R. BOLTON (*Analyst, 36 (1911), No. 424, pp. 333–342, fig. 1*).—The Polenske method according to these authors, who have applied it to numerous samples, is the only chemical method whereby small amounts of coconut oil can be detected and approximately estimated in butter, failures being due largely to a lack of scrupulous attention to the experimental details involved in the method.

The authors have, however, compared the effect of maintaining a constant temperature in the still-head with results obtained under the usual conditions of work. They conclude that "so long as reasonable care is taken to protect the still-head from draft, no error arises from this source; and as the maintenance of a high temperature depresses both the Reichert-Meissl and Polenske values, there is no advantage in employing a specially protected high-temperature still-head, beyond the fact that time, and to a certain extent the type of distillation, become of less importance."

The Shrewsbury and Knapp method (E. S. R., 24, p. 515), the cadmium method of Paal and Amberger (E. S. R, 21, p. 110), and Kirschner's method (E. S. R., 16, p. 1050) were also studied. The Shrewsbury and Knapp method was open to the objection that concordant results could not be obtained with the same samples. It was also modified by the authors, but the figures obtained with it were not as reliable as those obtained by the Polenske method. The cadmium method after a few tests was abandoned on account of its laborious execution and bad results in the authors' hands.

The Kirschner method was found to offer little in advance of the Polenske method for coconut oil and butter, but it had a decided advantage when applied to margarin containing both butter and coconut oil, or margarin containing coconut oil alone. It is the authors' conviction "that it is the only published method at present available which will decide whether butter fat is present in a margarin containing coconut oil, even if the amount be only 2 per cent in conjunction with 75 per cent or more of coconut oil." The method as employed by the authors is described in detail.

Examination of Shrewsbury and Knapp's process for the estimation of coconut oil, R. ROSS, J. RACE, and F. MAUDSLEY (*Analyst, 36 (1911), No. 422, pp. 195–198*).—This investigation was conducted with Irish, Danish, Finnish, Siberian, German, and English butters, coconut oils from various sources, cacao butter, and coconut stearin.

The highest Shrewsbury and Knapp figure for the butter was found to be 35.5 in contrast to 32 as suggested by Shrewsbury and Knapp as the maximum.

The authors point out that "in considering the genuineness or otherwise of a butter, it is doubtless advisable not to rely entirely on any particular figure, but to consider the case as a whole." It was found absolutely necessary to follow the process exactly as described by the authors, particularly as regards glycerol saponification. The method is probably of use in determining the composition of margarin.

A method for the determination of butter fat in ice cream, J. W. WHITE (*Pennsylvania Sta. Rpt. 1910, pp. 243–247*).—A method is proposed for using the Babcock test in the determination of butter fat in ice cream, as follows:

"Place the [Erlenmeyer] flask [containing the properly sampled ice cream] into a bath of water heated to 80° F. and shake frequently by giving the flask a gentle rotary motion until the contents assume the consistency of thin cream. Pour the melted cream through a cream sampling sieve into a beaker, rubbing through the fingers any lumps that may be left on the sieve; pour several times from one beaker to another until the sample is thoroughly mixed, and then weigh out into a whole milk bottle while the sample is still warm, 6 gm. by means of cream balances, and make the total volume up to 18 cc. Eight cc. of oil of vitriol (specific gravity 1.83) are now added in 2 portions of 4 cc. each, allowing about 2 minutes to elapse before the addition of the second portion and mixing carefully the contents of the bottle after the addition of each portion. The mixture at this stage should be of a light brown color and not black as is the case with milk. If a black color is obtained, it is best to reject the determination and weigh out a second portion, adding a smaller amount of acid, because the sample contains little casein as compared with milk, and the black color is due to the too violent action of the acid upon the sugar which it chars and makes a clear reading very difficult. The bottle is now placed in the steam tester and whirled for 3 minutes at the highest possible speed. [Soft or] distilled water (150° F.) sufficient to bring the fat up to the base of the neck is added. If any black particles are intermixed noticeably with the fat, shake the bottle vigorously for a few seconds Whirl again for 3 minutes as stated above, and add sufficient water, drop by drop, to bring the fat column between the 10 per cent and the zero marks. Whirl the third time for 2 minutes, and take the reading at 145° F. The resultant fat column should be of a golden yellow color, free from any dark particles of charred sugar. Multiply the reading by 3, as the bottle is graduated on a basis of 18 gm.

"In reading the percentage of fat, the bottle should be held upright with the graduated scale of the neck of the bottle on a level with the eye."

The methods used for sampling and weighing the ice cream under examination are also given.

A new method for the determination of fat and fatty acids in feces, O. FOLIN and A H. WENTWORTH (*Jour. Biol. Chem., 7 (1910), No. 6, pp. 421–426; abs. in Zentbl. Physiol., 24 (1910), No. 21, pp. 976, 977*).—The method is as follows:

One gm. of the dried and finely divided feces is packed into a piece of fat-free filter paper, put in a thimble, placed in an extraction apparatus, and extracted with 150 cc. of water-free ether which has been previously saturated with hydrochloric-acid gas. The ethereal fat solution (extract), which is contained in a 250 cc. solution flask, is now distilled until nearly all of the ether is driven off; then 50 cc. of petroleum ether (boiling point not over 60° C.) is added, allowed to stand over night, filtered through cotton, the volatile portion evaporated off, and the residue dried at 95° C. for 5 hours and weighed as neutral fats and fatty acids. The residue is then dissolved in 50 cc. of benzol, from 1 to 2 drops of alcoholic phenolphthalein is added, the solution brought nearly to boiling, and immediately titrated with a volumetric solution of sodium alcoholate (2.3 gm. of sodium in a liter of absolute alcohol).

The results show that the majority of the fatty acids in feces exist as stearin. In these tests the total fat fluctuated between 13.5 and 29.2 per cent, and the neutral fat from 4.5 to 5.4 per cent.

A clinical method for the quantitative determination of uric acid in blood, P. Roethlisberger (*München. Med. Wchnschr., 57 (1910), No. 7, pp. 344–347, figs. 4; abs. in Chem. Ztg., 34 (1910), No. 59, Repert., p. 229*).—Uric acid quickly reduces freshly prepared silver carbonate. The author utilized this reaction and has perfected a method in which as little as 0.001 mg. can be detected in blood serum.

Methods for the examination of bituminous road materials, P. Hubbard and C. S. Reeve (*U. S. Dept. Agr., Office Pub. Roads Bul. 38, pp. 45, figs. 18*).—This bulletin has for its purpose the presentation of the testing methods in use by the Office of Public Roads of this Department.

The topics treated include the classification of bituminous road materials, the scheme of examination, specific gravity and specific viscosity determinations, the float and penetration tests, melting point, flash and burning point determinations, volatilization and distillation tests, determination of bitumen soluble in carbon disulphid and insoluble in paraffin naphtha and in carbon tetrachlorid, determination of fixed carbon and paraffin scale, extraction of bituminous aggregates, grading the mineral aggregate, and determination of voids in the mineral aggregate. An appendix enumerates laboratory equipment, and presents metric conversion tables and similar data, and forms for reporting tests.

[Report of the department of chemistry], C. A. Jacobson (*Nevada Sta. Bul. 73½, pp. 47–49*).—In studies of the relation of the nitrogen to the organic constituents in the alfalfa plant what appear to be 3 compounds have been isolated from the alcoholic extract. One resembles a phosphatid, containing nitrogen, oxygen, hydrogen, and carbon, another contains neither nitrogen nor phosphorus, but carbon, hydrogen, and oxygen, and the third is soluble in water and resembles a proteid. The distillate obtained from the dry distillation of sagebrush by the Sparling process has been analyzed.

Report of the chemist, W. A. Withers (*North Carolina Sta. Rpt. 1910, pp. 17–21*).—Observations are reported on the phenol-disulphonic acid method for determining nitrates, the difficult solubility of nitrates in soils, tests of the Tiemann-Schulze method for nitrates and the Pickel condensor for ammonia, and the diphenylamin test for nitrites and nitrates.

Filtration of cloudy vinegars through infusorial earth, H. Wüstenfeld (*Deut. Essigindus., 15 (1911), No. 29, p. 230*).—The author recommends infusorial earth (kieselguhr) as a filtering medium for cloudy vinegars.

METEOROLOGY—WATER.

The application of meteorological data in the study of physiological constants, H. L. Price (*Virginia Sta. Rpts. 1909–10, pp. 206–212, figs. 2*).—The purpose of this paper is "to call attention to the application of the law of van't Hoff and Arrhenius to the changes involved in blooming phenomena and to emphasize the need of recognizing this principle in the study of the problem of physiological constants. While an arbitrary 'critical' temperature of 32° or 43° F. and an arbitrary period of dormancy, as January 1, and a sum total of positive temperature readings above the critical temperature selected may lead to constants which are roughly approximate, yet this method is faulty and can not be the means of establishing true physiological constants."

Alaska's climate, C. C. Georgeson (*Alaska Stas. Rpt. 1910, pp. 76–85*).—This is a summary in the usual form of observations on temperature, precipitation, and weather conditions at the different Weather Bureau stations in Alaska.

Meteorology, H. D. Edmiston (*Pennsylvania Sta. Rpt. 1910, pp. 255–266, 607–630*).—The observations here recorded are of the same character as those reported in previous years (E. S. R., 23, p. 516). The summary for 1909 is as follows:

Summary of meteorological observations, 1909.

	1909.	Growing season (April–September).
Barometer (inches): Mean	30.010	....
Temperature (°F.):		
Mean	47.3	60.8
Highest (Aug. 8–9)	92.0	92.0
Lowest (Jan. 19)	−4.0	[1] 18.0
Greatest daily range (Apr. 10)	47.0	....
Least daily range (Apr. 2)	1.0	....
Rainfall (inches)	43.35	28.38
Number of days on which 0.01 inch or more rain fell	130	61
Mean percentage of cloudiness	5.5	5.1
Number of days on which cloudiness averaged 80 per cent or more	93	37
Last frost in spring, May 12.		
First frost in fall, Sept. 6.		

[1] April 11.

Meteorological notes, H. L. Price (*Virginia Sta. Rpts. 1909–10, pp. 224–232, figs. 5*).—This is a summary of meteorological data secured since the publication of a 10-year summary in 1905 (E. S. R., 17, p. 836), and gives tabular records of temperature, precipitation, prevailing wind, sunshine, and charts showing the maximum, mean, and minimum temperatures by months and monthly precipitation. For the sake of comparison, the temperature and precipitation charts for 1893 to 1904 are reproduced. A general summary for the 15-year period is given.

The mean annual temperature for the 15 years was 51.34° F.. the maximum 96°, the minimum —13°. During the period the temperature fell below zero on January 10, 11, 15, and 16, 1893; December 29, 1894; January 12 and 13 and February 3, 6, 7, 8, 9, and 15, 1895; February 20 and 21, 1896; January 28 and 30, 1897; February 3 and 4, 1898; February 1, 9, 10, 11, 13, and 14, and December 31, 1899; February 1, and March 17 and 18, 1900; December 16 and 21, 1901; February 19, 1903; January 30 and February 6, 1904; February 14, 1905; February 7, 1907; February 2, 1908; November 16, 1908; and January 31, 1909. The temperature rose above 95° on August 10 and 11, September 3 and 10, 1900; and July 17, 1902. The mean annual precipitation for the period was 40.86 in. The highest monthly precipitation, 12.29 in., was in July, 1905, the lowest, 0.13 in., in October, 1904. The greatest depth of snow in 24 hours, 11 in., occurred January 9, 1895. The average date of last killing frost in spring was April 26, of first killing frost in fall October 2. The latest killing frost recorded was May 22, 1907, the earliest, September 22, 1897.

Meteorological, magnetic, and seismic observations of the College of Belen of the Society of Jesus, Habana. 1910, L. Gangoiti (*Observatorio Meteorologico, Magnetico y Seismico del Colegio de Belen de la Compañía de Jesus en la Habana, año de 1910. Habana, 1911, pp. 95, dgms. 3*).—Detailed reports, largely tabular and diagrammatic, of the usual observations.

Sixth annual report of the meteorological committee (*Ann. Rpt. Met. Com. [Gt. Brit.], 6 (1911), pp. 164, pls. 9, figs. 3*).—This consists as usual of administrative reports regarding organization and operations (during the year ended March 31, 1911) in marine meteorology, forecasts and storm warnings, climatology, publications, investigation of the upper air, and miscellaneous subjects, with appendixes as follows: Financial statement, supply of information to the public, lists of observers who sent in "excellent" meteorological logs during the year and of logs and documents received from ships, distribution of instruments, report on inspection of meteorological stations, and lists of persons and institutions from whom publications and meteorological data have been received and to whom publications are sent.

Variations in the English climate during the thirty years 1881–1910, W. MARRIOTT (*Quart. Jour. Roy. Met. Soc.* [*London*], *37* (*1911*), *No. 159, pp. 221–242, figs. 8; rev. in Surveyor, 40* (*1911*), *No. 1027, pp. 359–361*).—This article contains a set of tables based upon means of temperature, pressure, rainfall, and wind for the British Isles, and gives data bearing upon variations in mean monthly temperatures, recurring warm and cold months in successive years, hot and warm spells, recurring wet and dry months in successive years, and dry and wet spells.

British rainfall, 1910, H. R. MILL (*London, 1911, pp. 112+388, pls. 6, figs. 67*).—This report deals as usual with the amount and distribution of rainfall in the British Isles during 1910, as recorded by nearly 5,000 voluntary observers belonging to the British Rainfall Organization.

It contains a report of the director giving a detailed account of the year's work, and special articles on the greatest rainfall which may occur on the wettest day of the year, the rearrangement of the rainfall stations, and the rain gage in theory and practice. There are also records of evaporation and percolation at Camden Square, London, and several other places.

A new feature of this report to which special attention is called is the rearrangement of the stations in river basins, the county being retained as the unit. The cartographic treatment of rainfall data has also been carried further than in previous volumes and a new rainfall average has been introduced.

The average rainfall for the British Isles in 1910 was 41.77 in. as compared with a ten year average, 1900 to 1909, of 38.39 in., and a thirty-five year average, 1875 to 1909, of 38.49 in. The mean evaporation at 11 stations was 16.37 in. The percolation at 3 stations from which records were secured varied from 50 to 62 per cent of the rainfall.

The nitrogen compounds in rain and snow, F. T. SHUTT (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 4* (*1910*), *Sect. III, pp. 55–59*).—This article is based on data noted elsewhere (E. S. R., 24, p. 417).

On the absorption of ammonia from the atmosphere, A. D. HALL and N. H. J. MILLER (*Jour. Agr. Sci., 4* (*1911*), *No. 1, pp. 56–68; abs. in Jour. Chem. Soc.* [*London*], *100* (*1911*), *No. 586, II, pp. 763, 764*).—Monthly determinations during two years of the amounts of atmospheric ammonia absorbed by dilute sulphuric acid in dishes 26.5 cm. in diameter are reported.

"The highest results were obtained with dishes kept at a height of about 115 cm. above the ground in front of the Rothamsted laboratory, near the outside of the town, the nitrogen absorbed amounting to 1.48 lbs. per acre per annum. In dishes in the same situation, but only 5 cm. above the ground, the amount absorbed was only 0.85 lb.

"Dishes placed in the experimental grass plats showed somewhat higher results in the upper dish (0.78 lb.) than in the lower one (0.70 lb.). In the experimental wheat field the absorption in the upper dishes was 1.14 lbs., and in the lower dishes 1.53 lbs. The higher results obtained in the wheat field as compared with the grass plats are mainly due to considerable amounts of ammonia given off by the soil for some weeks following the application of ammonium salts to some of the wheat plats. In April, 1909, the absorption in the upper and lower dishes in the wheat field was 0.29 and 0.61 lb., respectively. During the ten months not affected by the manures, the average absorption in the wheat field was higher in the upper than in the lower dishes."

Impurities in the atmosphere of towns and their effects upon vegetation, A. G. RUSTON and C. CROWTHER (*Rpt. Brit. Assoc. Adv. Sci., 1910, pp. 577, 578*).—A study of the impurities in samples of air, taken in different parts of the city of Leeds and at a point in the country 7½ miles distant from the center of the city, showed a relatively high content of suspended matter and acid in the town air, both of which are carried down in the rain in sufficient quantity to be distinctly injurious to vegetation.

Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, H. STABLER (*U. S. Geol. Survey, Water-Supply Paper No. 274, pp. 188*).—This is "a report setting forth the results of a systematic study of the waters likely to be utilized on the Reclamation Service projects. This study was made in order to determine the influence of the salinity of the waters on the growth of vegetation and the effect of suspended matter in silting canals and reservoirs. [The report] contains tables giving analyses, gage heights, rates of discharge, and relative amounts of substances in solution in the waters of different rivers."

Geology and water resources of Estancia Valley and adjacent parts of central New Mexico, O. E. MEINZER (*U. S. Geol. Survey, Water-Supply Paper No. 275, pp. 89, pls. 14, figs. 7*).—This paper gives the results of brief reconnaissance surveys of Estancia Valley, an area of about 2,000 square miles near the geographic center of New Mexico, and of Encino basin, which lies immediately east of Estancia basin. Notes are given not only on geology and water resources, but also on soils and irrigation.

Chemical and biological survey of the waters of Illinois, 1909 and 1910, E. BARTOW (*Univ. Ill. Bul., 8 (1911), No. 23, pp. 148, figs. 28*).—This contains a brief general report, notes on the organization of the Lake Michigan Water Commission and the Illinois Water Supply Association, and the following special articles: Composition and treatment of Lake Michigan water, the action of bleaching powder in water purification, treatment of water with boiler compounds, relation of typhoid fever and the water supplies in Illinois, analytical control of water softening, nitrite destruction test for a polluted water, a convenient camera for color comparisons in Nessler tubes, additional farm water supplies, a water works laboratory, and suggested disposal of drainage at Tolono.

The geochemical interpretation of water analyses, C. PALMER (*U. S. Geol. Survey Bul. 479, pp. 31, fig. 1*).—This bulletin is devoted to "an exposition of the principle that natural water may be definitely characterized if the salts dissolved in it are recognized not as a load but as a chemical system of balanced values. The relation of silica to primary alkalinity and the persistence of silica in river waters are among the topics considered."

The treatment of drinking water with ultraviolet rays, L. SCHWARZ and AUMANN (*Ztschr. Hyg. u. Infektionskrank., 69 (1911), No. 1, pp. 1-16, fig. 1; 68-91, figs. 3*).—The results of numerous experiments are reported, showing that ultraviolet rays are effective in reducing the germ content of water but that the efficiency of the process depends upon the original germ content of the water and the thoroughness with which it is stirred during the treatment, as well as upon the length of treatment. Special care must be exercised in the treatment of water containing large numbers of germs, and the authors are of the opinion that this method of treatment as at present developed is not practically applicable except under special conditions.

SOILS—FERTILIZERS.

The fixation of nitrogen in some Colorado soils, W. P. HEADDEN (*Colorado Sta. Bul. 178, pp. 3–96, pls 6*).—Further investigations on the injurious nitrates in Colorado orchard soils (E. S. R., 23, p. 523) are reported, including additional analyses of the water-soluble portion of a number of soils from barren spots and tests of the rate of nitrogen fixation and nitrification in the soils.

The author states that the spread of the trouble during 1910 was very marked and that the intensity of the attacks has increased rather than abated. Areas of several hundred acres on which fruit trees are dead or dying as a result of nitrate injury are involved. "In one 14-year-old orchard not less than 12 acres of trees, apple, plum, pear, and cherry, together with currant bushes and other small fruit, have been killed in less than a year. The water table in this land was not, at any time, near enough to the surface to do any damage.

"No single instance of the death or eradication of a brown area, a niter spot, has been observed; but the interior of such areas has been found so excessively rich in salts that the ground has become barren, even of the Azotobacter flora.

"This deportment of the bacteria suggests the probability that the land may again become fertile after a few years, in fact, varieties of Atriplex, saltbushes, are already taking possession of land which has been devoid of vegetation for several years.

"The drainage in several of the cases given is excellent, in other cases drains have been laid for periods of from one to five years without preventing the formation of niter areas.

"Trees badly affected by this trouble show almost no recuperative power, probably due to the continued excessive supply of nitrates in the soil, possibly to the severe toxic action of the nitrates. So far as our observation goes both factors seem to be involved. Slightly affected trees may recover but no badly affected tree has been observed to do so.

"The generally observed change in the soil, indicating danger to the trees, is a turning brown of the surface which is expressed by the statement that 'the soil turned brown or black and the trees died.'

"The samples of brown soil have, without exception, contained excessive quantities of nitrates.

"The color is not due to the nitrates nor to sodic carbonate or black alkali proper but to the development of pigments by the Azotobacter. This applies to the soils here described. Some soils may have a brown color due to other causes.

"This condition is usually preceded and accompanied by a mealiness of the soil, often described as ashy. There is usually but little or no efflorescence on such soils though it sometimes occurs.

"The time required for the killing of a tree varies with the virulence of the attack, in bad cases from four days to two weeks. Slightly affected trees may linger a long time.

"These areas may occur in perfectly drained land, situated in the midst of land which shows no abnormal quantities of nitrates.

"In one case, and possibly in others also, injury to many trees followed the application of water, probably due to the washing of the nitrates down into the soil. . . .

"The ordinary white alkali that commonly occurs in these sections is, for the most part, free from nitrates, but the brown and white areas frequently overlap.

"The ground waters, unless derived from niter areas, are free from nitrates and these nitrates cannot be accounted for by the evaporation of such water from the surface of these areas.

"In some sections practically the whole of the irrigated land has been affected, thus eliminating the question of transportation except as to the river water used for irrigation. Our river waters carry from 0.00 to 0.4 part per million of nitrogen as nitrates.

"The localization of these areas and the rate of increase also preclude the theory of transportation and concentration.

"Excessive irrigation for the purpose of washing out the 'black alkali,' nitrates, has not been successful, but this failure has probably been due to the method used.

"The liberal application of manure has not given permanent, if indeed, any relief.

"Thorough and frequent cultivation has not been followed by the beneficial results expected.

"The soils of Colorado are, generally speaking, poor in nitrogen, but the ratio of nitric nitrogen to the total nitrogen is frequently very high, 17 to 50 per cent being not uncommon.

"The nitrogen in these soils is fixed by Azotobacter which use the nitrogen in the air to build up their tissues.

"The fixation of nitrogen, in a sample of ordinary soil from the college farm, collected December 12, 1910, on incubation for 27 days was found to have taken place at the rate of 5,222 lbs. of nitrogen, equal to 17.5 tons of proteids per acre-foot of soil per annum.

"The nitric nitrogen present in this soil at the beginning of the experiment corresponded to 840 lbs. of sodic nitrate per acre-foot of soil; this had increased in 48 days to 1,999 lbs. as a maximum, a gain of 1,159 lbs. which would give, if this rate were continued for a year of 360 days, a gain of 8,676 lbs., or 4⅓ tons of nitrates per acre-foot of soil.

"The incubated samples, with but one exception, showed a darkening of their surfaces.

"No addition of anything except boiled, distilled water was made to these samples before or during incubation. A large bottle was partially filled with some, approximately 8 lbs., of the original sample just as it was collected. This bottle was loosely stoppered, inverted and kept in a room where the temperature was fairly high and even. This soil was analyzed just as the incubated samples were and showed a decided increase in both the total and nitric nitrogen, 7.45 and 19.15 per cent respectively.

"Fixation takes place rapidly in this soil in the presence of from 13.5 to 20 per cent of water. The rate of fixation of nitrogen obtained is sufficient to account for the nitrates found in the soil provided that it is nitrified.

"The rate of nitrification obtained is sufficient to account for the formation of the nitrates found, in most cases if not all of them."

Bacteriological studies of the fixation of nitrogen in certain Colorado soils, W. G. Sackett (*Colorado Sta. Bul. 179, pp. 3–42, pls. 2, figs. 5*).—With a view to determine the source of the excessive amounts of nitrates in certain Colorado soils (E. S. R., 28, p. 221) the author made a bacteriological study of the nitrogen fixing power of these soils in nutrient solutions and in the soils themselves. A study was also made of the relation of nitrates, other nitrogen compounds, and various salts in the nutrient solution to the characteristic brown color of the niter spots. In most of the culture work the mannite solution recommended by Lipman was used except that tripotassium phosphate (K_3PO_4) was substituted for the dipotassium phosphate (K_2HPO_4).

The author concludes from the results obtained in these studies that "the power to fix atmospheric nitrogen is a property common to many cultivated Colorado soils. This power is not confined to nitrogen fixation in solutions, but is manifested in soils as well. 'The rate of fixation of nitrogen obtained is sufficient to account for the nitrates found in the soil provided that it is nitrified. The rate of nitrification obtained is sufficient to account for the formation of the nitrates found, in most cases if not all of them.'

"The nitrogen fixing power is not limited to any geographical locality or class of soils, however the adobe shale soils, both in a raw state and newly cultivated, possess little if any nitrogen fixing power. Excessive nitrates either destroy or greatly attenuate the nitrogen fixing flora of a soil. A limited amount of soil nitrate does not seriously affect the nitrogen fixing power of a soil; *Azotobacter chroococcum* appears to be the dominant nitrogen fixing organism in the soils studied. The dark brown color of the niter soils is due, in a large part, to the pigment produced by *A. chroococcum*. Given a source of energy, the nitrate is the limiting factor in the production of the brown color. In the presence of nitrates, *A. chroococcum* develops a chocolate brown to black pigment; nitrites, in certain amounts, produce similar results, but to a less degree; nitrogen as NH_4Cl., $(NH_4)_2SO_4$, asparagin, and peptone has no effect upon this function. The highly colored extracts obtained from certain niter soils suggest that the pigment of *A. chroococcum* may be soluble in the alkaline soil waters. Excessive soil moisture, by interfering with the growth of *A. chroococcum* prevents the formation of the brown color on the soil, and makes the fixation of atmospheric nitrogen impossible."

The fixation of nitrogen by means of Bacillus radicicola without the presence of a legume, E. B. FRED (*Virginia Sta. Rpts. 1909–10, pp. 138–142, figs. 3*).—The results of experiments in liquid media, sand, and soil show that the nitrogen assimilation, although very small, "was sufficient to give a reasonable basis for the belief that *B. radicicola* will live in the soil without the host plant and accomplish a certain amount of nitrogen assimilation."

The inhibition of nitrification by organic matter, compared in soils and in solutions, F. L. STEVENS, W. A. WITHERS, ET AL. (*North Carolina Sta. Rpt. 1910, pp. 36–51*).—Previously noted from another source (E. S. R., 23, p. 721).

A comparative study of the bacterial content of soils from fields of corn and alfalfa, H. H. WAITE and D. H. SQUIRES (*Nebraska Sta. Rpt. 1910, pp. 160–177, figs. 4*).—This article reports counts and studies of cultural characteristics of the bacteria to a depth of 12 ft. in two fields of loess soil which have been in cultivation for 30 years. The cornfield had never been cropped in alfalfa; the alfalfa field had been in alfalfa for the past seven years.

Corn soil showed a decidedly greater number of bacteria in the first 3 ft. than the alfalfa soil. "Azotobacters were shown to be in all levels of the alfalfa field except the first, seventh, tenth, and eleventh; and in all levels of the cornfield except the first, third, fourth, and eighth foot, showing a good distribution of Azotobacters as to depth."

The great majority of the organisms isolated were acid formers. The methods used are described and a bibliography of 32 references is given.

Some observations on humus formations in the soil, S. P. KRAVKOV (*Dnevn. XII. S'iezda Russ. Est.-Isp. i Vrach.* [*Moscow*], *p. 688; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 5, p. 736*).—An examination of the composition of the ash of different plant residues and of the black extract of the underlying soil horizon showed a relationship which may be used in classifying the humus formations.

A contribution to the knowledge of the protozoa of the soil, T. GOODEY (*Proc. Roy. Soc.* [*London*], *Ser. B, 84* (*1911*), *No. B 570, pp. 165–180, pl. 1, fig. 1*).—Investigating further the suggestion of Russell and Hutchinson (E. S. R., 24, p. 621) that protozoa limit the action of bacteria in soils with an accompanying decrease in ammonia production, the author found that "the ciliated protozoa which are so characteristic a feature of cultures made from soil only exist in the soil in an encysted condition. In consequence, they cannot function as the factor limiting bacterial activity in the soil." The investigations dealt only with ciliated protozoa, not with amœbæ and flagellates.

Earthworms and soil fertility, STEGLITZ (*Fühling's Landw. Ztg., 60* (*1911*), *No. 15, pp. 538–542*).—The author reviews the work of other investigators on the subject, with particular reference to the investigations by Russell (E. S. R., 24, p. 424), and takes the position that earthworms and other animal life have an effect not only in bettering the physical condition of the soil and thus promoting the production of nitrates, but that they render available as plant food the mineral elements of the soil as well.

The soil and the plant, E. J. RUSSELL (*Sci. Prog. Twentieth Cent., 6* (*1911*), *No. 21, pp. 135–152, pl. 1*).—This is a review of American hypotheses of soil fertility, particularly those of the Bureau of Soils, pointing out the outstanding differences between them and those generally accepted. It is held that the results of experiments at Rothamsted point to the great importance of the nutritive function of the soil constituents and of added fertilizers, and the theory that plants excrete toxic substances is not accepted.

A bibliography of the literature is given.

Field operations of the Bureau of Soils, 1908 (tenth report), M. WHITNEY ET AL. (*U. S. Dept. Agr., Field Operations of the Bureau of Soils, 1908, pp. 1428, pls. 8, figs. 38, maps 37*).—This report contains a general review of the field operations of the Bureau of Soils during 1908, by the Chief of the Bureau, together with detailed accounts of the following surveys:

Caribou area, Me., by H. L. Westover and R. W. Rowe; Livingston County, N. Y., by M. E. Carr, G. A. Crabb, P. O. Wood, H. O. Tiffany, H. J. Wilder, and E. O. Fippin; Montgomery County, N. Y., by O. Lee, jr., and C. Lounsbury; reconnaissance survey of northwestern Pennsylvania, by H. J. Wilder, G. B. Maynadier, and C. F. Shaw; Center County, Penn., by C. N. Mooney, C. F. Shaw, L. A. Kolbe, H. H. Bennett, and R. T. Allen; Robinson County, N. C., by W. E. Hearn, G. M. MacNider, and J. E. Turlington; Caswell County, N. C., by W. E. Hearn and F. P. Drane; Grady County, Ga., by H. H. Bennett et al.; Thomas County, Ga., by H. H. Bennett and C. J. Mann; Lamar County, Ala., by E. R. Allen and W. L. Lett; Henry County, Ala., by G. B. Jones, E. S. Pace, and H. L. Westover; Autauga County, Ala., by L. A. Hurst and C. S. Waldrop; Colbert County, Ala., by W. G. Smith, C. S. Waldrop, J. C. Britton, and C. R. Zappone, jr.; Cullman and Bibb Counties, Ala., by W. E. Tharp and W. L. Lett; Calhoun County, Ala., by L. A. Hurst and P. H. Avary; Etowah County, Ala., by W. S. Lyman and C. S. Waldrop; Jefferson County, Ala., by H. C. Smith and E. S. Pace; Holmes County, Miss., by W. J. Geib; Monroe County, Miss., by R. A. Winston, O. Lee, jr., A. W. Mangum, W. J. Latimer, A. E. Kocher, and H. C. Smith; Bienville Parish, La., by T. A. Caine, E. B. Watson, T. D.

Rice, W. J. Geib, W. S. Lyman, and H. L. Belden; East Carroll and West Carroll parishes, La., by E. L. Worthen and H. L. Belden; Corpus Christi area, Texas, by A. W. Mangum and H. L. Westover; Franklin County, Texas, by A. E. Kocher and W. S. Lyman; Camp County, Texas, by W. J. Geib, E. B. Watson, T. D. Rice, and C. Lounsbury; Overton County, Tenn., by O. L. Ayrs and D. H. Hill; Coffee County, Tenn., by W. E. McLendon and C. R. Zappone, jr.; Parkersburg area, W. Va., by F. N. Meeker and W. J. Latimer; Wexford County, Mich., by W. J. Geib; Allen County, Ind., by G. B. Jones and C. Van Duyne; Bates County, Mo., by C. J. Mann, A. L. Higgins, and L. A. Kolbe; Richland County, N. Dak., by F. Bennett, E L Worthen, R E. Willard, and E. B. Watson; western North Dakota, by M. H. Lapham et al.; Modesto-Turlock area, Cal., by A. T. Sweet, J. F. Warner, and L. C. Holmes; Portersville area, Cal., by A. T. Strahorn, L. C. Holmes, and C. W. Mann; Pajaro Valley, Cal., by W. W. Mackie; and Klamath reclamation project, Oreg., by A. T. Sweet and I. G. McBeth.

During the calendar year 1908, 22,280 square miles, or 14,259,200 acres, were surveyed and mapped in detail on a scale of 1 in. to the mile, making the total area surveyed and mapped up to the end of that year 171,787 square miles, or 109,943,680 acres. The average cost of the field work in 1908 was $3.33 per square mile.

In addition to the detailed surveys, there were conducted in 1908 reconnoissance surveys in parts of North Dakota, Pennsylvania, and Texas, covering a total area of 50,352 square miles, or 32,225,280 acres. The average cost of these surveys was 32 cts. per square mile.

These reconnoissance soil surveys were undertaken in 1908 in the region west of the one hundredth meridian, work being started both in North Dakota and Texas to determine the character of the soil and crop adaptations in the Great Plains region. Similar work has also been begun in the cut-over timber lands of the Great Lakes section, and arrangements have been made for the study of the cut-over timber lands of the Puget Sound region in conjunction with the State of Washington.

A report on the agriculture and soils of Kent, Surrey, and Sussex, A. D. Hall and E. J. Russell (*London: Bd. Agr. and Fisheries, 1911, pp. VIII+206, pls. 42, figs. 4*).—Since the publication of a preliminary report on the soils of Kent and Surrey counties (E. S. R., 14, p. 644) the scope of this survey has been so enlarged as to add Sussex County to the area and to include the general agriculture of the region. The mechanical analyses of the soils previously made at Wye have also been repeated in order to obtain uniformity in the results here reported, there being variations in the method of analysis now followed (sieve and sedimentation) and that adopted in the earlier work. This book, therefore, is a complete and detailed report of a survey of the soils and agriculture of the counties of Kent, Surrey, and Sussex of southeastern England, and contains chapters on the natural features of the district, its agriculture, soils, including mechanical and chemical analyses, the relation of soils to crops, and building stones and other economic products.

The authors have taken the geological formations as the basis of their work, and their experience in the field "goes to show that each formation in the area under consideration gives rise to a distinct soil type, the characteristic composition of which can further be recognized by making up an average from the mechancal analyses of the samples taken from that formation." The evidence also goes to show that the mechanical analysis "does determine the fundamental structure of the soils, and that fair agreement may be expected between the composition of samples taken in a particular area."

It is hoped that the report "may demonstrate the possibility of a soil survey useful to the farmer, and indicate the lines on which it can be fruitfully carried out."

Relation between granitic and gneiss soils (*Rev. Sci.* [*Paris*], *49* (*1911*), *I, No. 23, p. 724*).—This article is based on the work of M. Sauer and points out the principal differences in the physical properties of granitic and gneiss soils.

Granitic soils are sandy and nonretentive of lime, gneiss soils are clayey and retentive of lime. In granitic soils the fine particles wash down into the subsoil where they form ferruginous organic cement (hardpan) which prevents the percolation of water. This phenomenon does not occur in gneiss soils. Granitic regions are apt to contain peat moors, whereas these are more rare in case of gneiss soils.

Mechanical analysis and cartographic grouping of rocks and soils, G. Tumin (*Ezheg. Geol. i Min. Rossii, 12* (*1910*), *No. 12, pp. 26–37; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 5, pp. 730, 731*).—The author contends that the grouping of soils according to the proportion of clay and sand present is unsatisfactory and that a third constituent, silt, must be considered. The three-constituent formula more closely represents the peculiarities of the mechanical composition. The advantage of taking account of the three constituents is illustrated by results of examinations of a number of samples of soil.

Morphological types of soil formations, G. M. Tumin (*Dnevn. XII. S''i͡ezda Russ. Est.-Isp. i Vrach.* [*Moscow*], *p. 628; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 5, p. 732*).—From the morphological standpoint soils are considered to be a body of definite organization and structure and on this basis the author outlines a classification of the soils of Russia.

Classification of clays, H. Stremme (*Chem. Ztg., 35* (*1911*), *No. 59, pp. 529–531*).—The author reviews the present literature of the subject, stating that clay is formed from such kaolinized rocks as contain the principal clay minerals, namely, weathered feldspars and allophanes. Feldspars are crystalline and contain alumina and silicic acid in chemical combination; the molecular ratio of the two may vary between that of feldspar and kaolin. Allophanes are colloidal and contain aluminum and silicic acid gels. The molecular relation of the two varies between pure alumina and pure silicic acid.

Turkestan loess, S. S Neustruev (*Dnevn. XII. S''i͡ezda Russ. Est.-Isp. i Vrach.* [*Moscow*], *p. 493; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 4, p. 582*).—The observations of the author led him to the opinion that views as to the eolian origin of the loess soils require a revision. In many places he detected a connection between the loess and the eluvial rocks of the Turkestan mountains, where the ancient species give fine-grained, carbonate-carrying, yellow products of weathering which are transported by the atmospheric agents to the slopes.

Examinations of soil samples, V. Lommel and A. Pauly (*Ber. Land u. Forstw. Deutsch-Ostafrika, 3* (*1911*), *No. 5, pp. 248–262*).—The authors report the results of chemical analyses of a number of samples of soil from British and German East Africa surrounding Lake Victoria Nyanza and extending south into British Central Africa, besides samples of the German cotton soils of the neighboring districts. The results show a high plant food content for the volcanic soils, a low phosphoric acid and in some cases a low potash content in the nonvolcanic soils, and a general moderately high nitrogen content in both soils.

Inferior soils in the Grafton-Casino district, H. C. L. Anderson (*Agr. Gaz. N. S. Wales, 22* (*1911*), *No. 3, pp. 185, 186*).—The soils between Casino and

Grafton, New South Wales, being held in low esteem by settlers, the author analyzed 2 samples of these soils with a view to determine their adaptability to the growing of forage crops by judicious manuring and crop rotation, including legumes.

He came to the conclusion that the agricultural possibilities of these soils are better than those of others held in much higher esteem. The poorest sample contained fair amounts of nitrogen, potash, and phosphoric acid, 0.056, 0.051, and 0.063 per cent respectively, but the lime content was deficient, being only 0.076 per cent. The second sample was darker in color and deeper and contained nitrogen 0.077 per cent, potash 0.05 per cent, phosphoric acid 0.088 per cent, and lime 0.145 per cent.

Soil studies in 1909, B. E. Brown, W. H. MacIntire, et al. (*Pennsylvania Sta. Rpt. 1910, pp. 47–129, pls. 3, dgm. 1, charts 14*).—The general plan and scope of these studies which were made on plats of the long-time rotation and fertilizer experiments of the station are described and reports are given on specific lines of investigation as follows:

Seasonal nitrification and soil moisture in four plats treated with commercial fertilizers (pp. 50–57).—Weekly determinations of moisture and nitrates in plats treated with sodium nitrate and ammonium sulphate indicated that the decreased yield of corn on the plats which had received ammonium sulphate continuously for a number of years was not due to a reduction of nitrates in the soil of the plats since a larger amount of nitrates was found in these plats than in those treated continuously with sodium nitrate. It was shown, however, that the lime requirements of the ammonium sulphate plats were greater than those of the sodium nitrate plats. There was no marked variation in the moisture content of the plats.

Seasonal nitrification, soil moisture, and lime requirement in four plats receiving sulphate of ammonia (pp. 57–63).—Studies similar to those noted above were made on plats of corn, oats, wheat, and hay which had been continuously fertilized with ammonium sulphate to determine the relation of the kind of crop as well as the fertilizing, to the soil conditions.

It was found that the lime requirement was greatest in the oat plat and least in case of the corn plat but that the lime requirement varied at different periods of growth. "The amount of nitrates recoverable from the 4 plats was greatest under corn; oats, wheat, and hay following in the order named. The effect of plowing, incorporation of organic matter and plant residues, etc., apparently were closely associated with the amount of nitrates formed. The amounts of moisture present at the time the different crop plants were growing showed no marked variation." It was found in pot experiments that the soil showing the smallest lime requirement (which also contained the greatest amount of nitrates) produced the greatest growth of wheat for a period of 18 days.

The relation of certain soil constituents under growing corn, oats, wheat, and grass as determined periodically (pp. 64–82).—In laboratory investigations on soil from certain plats of the long-time rotation experiments to determine the seasonal variations of water-soluble nitrogen, potash, lime, phosphorus, and total solids as influenced by growing plants, fertilizer treatment, soil temperature and moisture, rainfall, and tillage methods, the largest amounts of nitrates, water-soluble calcium and potassium, and moisture were found in the corn plat. The nitrates recoverable from the corn plat were greatly reduced as the season progressed, but the nitrate content of the grass and wheat plats was low throughout the season. The concentration of the soil extracts with respect to calcium and potassium was lowered as the season advanced. The water-soluble phosphoric acid was largest in the corn plat, followed in order by oats, grass, and wheat. The soil extracts varied widely in concentration at different periods. Experiments in wire-gauze pots showed that in general the soils from which the greatest amount of water-soluble constituents was recoverable produced the best growth of wheat. Bottle culture experiments showed that the untreated extract of the soil of the corn plat produced better growth of wheat than the extracts of soils of other plats whether treated or untreated. The corn plat extract was benefited least by treatment with absorbent substances like carbon black. Boiling was especially effective in improving the extracts for the growth of wheat.

An investigation of the causes of variation in soil fertility as affected by long continued use of different fertilizers (pp. 82–91).—In studies similar to those noted above determinations were made of water-soluble nitrogen, calcium, potassium, phosphorus, and total solids, under corn in 8 plats receiving different treatment to ascertain the causes of the differences in yield on these plats.

Very little difference was found in the moisture content of the plats. The amount of nitrates recoverable varied considerably at different times during the growing period of corn and as a rule the greatest amount of nitrates was found in the high yielding plats early in the season. There were only slight variations in water-soluble calcium, but a marked variation in the water-soluble potassium, a close relation apparently existing between the field treatment and the amount of water-soluble potassium. The higher content, however, was not always associated with high yields. In general the amount of potassium recoverable decreased as the season advanced. There were only slight variations in the water-soluble phosphorus of the different plats. Determinations of total solids indicated that the least productive plats furnished extracts of greater concentration than the plats which produced the greatest yields.

Comparative physical and chemical studies of five plats, treated differently for twenty-eight years (pp. 92–117).—The chemical and physical studies here reported were made on plats of the long-time rotation experiments which had received lime, lime and manure, and commercial fertilizers continuously for 28 years.

The results were not conclusive as to the causes of differences in yield on the differently treated plats. Alcohol digestion or extraction seemed to offer promising means of determining the presence of crystalline organic bodies in soils and the character of the organic matter of the soil appeared to be an important factor in determining the differences in yield.

The forms of organic nitrogen in soils (118–129).—Previous work by other investigators on this subject is reviewed, and studies of the organic nitrogenous compounds in soils of certain of the long-time rotation plats by the method of Hausmann modified by Osborne and Harris (E. S. R., 15, p. 221) are reported.

The results indicate that the nitrogenous matter of limed soils is more resistent to agencies of decomposition than that of unlimed soils. The decomposition of the nitrogenous matter of limed soils apparently proceeds very gradually, resulting eventually in from 16 to 21 per cent of the nitrogen being given off as ammonia and from 21 to 34 per cent being converted into amino acids, the remaining 40 to 60 per cent of the nitrogen being either partially or almost wholly unavailable for plant use.

Studies in organic soil nitrogen, E. C. Lathrop and B. E. Brown (*Jour. Indus. and Engin. Chem., 3 (1911), No. 9, pp. 657–660*).—This is a brief account of studies noted above.

General composition of the grass lands contiguous to the general fertilizer plats, W. Frear and J. W. White (*Pennsylvania Sta. Rpt. 1910, pp. 163–235, pl. 1*).—Continuing previous work (E. S. R., 23, p. 521), an account is here given of a detailed study of samples of soil from the roadways surrounding and running through the long-time rotation plats at the station for the purpose of determining if possible the differences between the character of soil of these roadways and of the differently treated plats, of which studies were not made at the time the rotation experiments were undertaken. The studies reported included "(1) an examination to determine the average mechanical composition of the soil—i. e., the proportions in which particles of different, specific dimensions, enter to make the entire soil, surface and subsoil; (2) a chemical examination, more complete than usual, into the composition of the mineral matters of the soil; (3) a general study of the soil's organic materials."

Among the more important facts brought out by these studies are that although formed by the weathering of limestone rocks the soil contained little if any calcium carbonate, while magnesia although less abundant than lime in the original rock was present in the soil in considerably larger amounts than lime. Quartz formed a large fraction of the undecomposed portion of the rock remains in the soil. The remainder of the undecomposed rock was chiefly an aluminum-potassium silicate with smaller quantities of soda, lime, magnesia, and iron. Manganese was present in small quantity and titanium was quite abundant. The surface soil was distinctly acid. The "active humus" content was 1.96 per cent in the surface soil and 1.08 in the subsoil. Pentosans were present in the organic matter to the amount of 0.142 per cent, forming 4.65 and 4.47 per cent, respectively, of the active humus of the surface and subsoil. The surface and subsoil, free from hygroscopic moisture, contained 0.1492 and 0.0676 per cent of nitrogen, respectively. The nitrogen content of the organic matter of the surface and subsoil was 4.18 and 3.98 per cent, respectively. The surface soil contained only 0.076 per cent carbon dioxid, the subsoil 0.143 per cent. There was 0.5 per cent of lime in the surface soil and a little less in the subsoil. The surface soil contained 0.7 per cent and the subsoil 0.9 per cent of magnesia. The soil contained 3.5 per cent of potash, three-fourths of which was in the undecomposed rock residues. The available potash by the Dyer method was 0.0111 per cent in the surface soil and 0.00817 per cent in the subsoil. Phosphoric acid was present to the amount of 0.13 and 0.1 per cent, respectively, in the surface and subsoil. The available phosphoric acid by the Dyer method was 0.008 per cent in the surface soil and 0.002 per cent in the subsoil. In spite of the fact that this soil appears to be fairly well supplied with phosphoric acid, it has always shown a marked advantage from the application of phosphates. This is ascribed to the presence of iron and alumina in large amounts and in conditions favorable to the formation of rather insoluble phosphates. Of the iron present in the surface soil about one-third was found to be in the ferrous condition, a smaller proportion of the ferrous iron being found in the subsoil.

The methods used in the soil study are described.

Contribution to the study of phosphoric acid in soils and fertilizers, W. B. ELLETT and H. H. HILL (*Virginia Sta. Rpts. 1909–1910, pp. 44–65, figs. 8*).—This is a preliminary report upon laboratory and pot experiments which have been going on for several years to determine what becomes of the phosphoric acid from fertilizers left in the soil after the removal of the first crop, and to what extent this residual phosphoric acid becomes unavailable. The experiments were made with various typical Virginia soils and the phosphates used were phosphatic slag, and tricalcium, dicalcium, and monocalcium phosphates.

The experiments with various solvents used to determine the availability of the phosphoric acid showed "that the substances found in the different soil types fix phosphoric acid from water solutions into compounds of different solubility. The hydroxids of iron and aluminum lock up or fix 60 to 70 per cent of the water-soluble phosphates into insoluble or, as measured by these solvents, into unavailable form. Where lime was mixed with equal quantities of iron or aluminum hydroxids, the fixation of phosphoric acid was not so great, as 57 per cent was available, showing that a part combined with lime. Where calcium and magnesium carbonates were used as a fixing agent the resulting compounds were completely dissolved and would have to be classed as available."

The weights of the crop produced in the pot experiments indicated "that iron and aluminum do not fix the phosphoric acid in forms unavailable to the wheat plant. As a part of the phosphoric acid was available in the iron and aluminum compounds, as shown by the solvents, and as 0.6 gm. of phosphoric acid was added to each pot, which would be more than could be removed by the wheat, a second crop was grown, using oats, without the addition of more phosphates. . . . The second crop of oats shows practically the same results as the first crop of wheat, that is, the iron and aluminum compounds produce more plant growth than the calcium compounds, and are more available. . . . The corn experiments from the first and second crops confirmed the results obtained with wheat and oats and indicate that the solvents used by chemists to determine the availability of phosphoric acid, when applied to the products of fixation or reversion of phosphates by iron and aluminum, do not represent, in any way, their true availability, and can not be correlated with what the plant can or can not assimilate."

The conditions of soil climate in relation to the nitrogen and soluble phosphoric acid of the soil, R. Perotti (*Rend. Soc. Chim. Ital., 2. ser., 2 (1910), pp. 143-148*).—The relation of climatic conditions in the soil to the decomposition of organic matter and the formation of humus, and its influence upon the nitrogen supply, bacterial activity, and availability of mineral constituents of the soil, are briefly discussed in this article.

The influence of lime and humus on the mechanical and physical properties of clay, loam, and sandy soils, W. Thaer (*Gekront. Preisschr. Univ. Göttingen, 1910, pp. 145; Jour. Landw., 59 (1911), Nos. 1, pp. 9-57; 2, pp. 107-135; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 585, II, pp. 648, 649; Ztschr. Angew. Chem., 24 (1911), No. 37, p. 1776*).—In investigations here reported it was found that the calcium of soils was in combination with carbon dioxid and colloidal acids and in case of humus sand also in combination with strong mineral acids. The addition of lime to the soils resulted in a precipitation of colloids, in an increase of permeability and water-holding power, and in a decrease in shrinkage on drying.

As regards permeability, the action of lime on the humus colloids and the clay colloids was the same, but it decreased swelling of the former while it increased the permeability of the clay colloids. The effect of the action of lime on both humus colloids and other colloids was to increase ease of cultivation of the soil. In case of humus soils the addition of lime was especially favorable to nitrogen fixation and nitrification.

The methods of investigating the soluble soil colloids are described.

Soil evaporation, G. H. True (*Nevada Sta. Bul. 73½, pp. 32, 33*).—In experiments with jacketed tanks sunk in the soil and given surface irrigation equal to a depth of 6 in., "the average loss of moisture for the tanks not cultivated was equal to a depth of 1.71 in. over the whole surface, and that from the cultivated tanks 1.3 in., the loss by evaporation being decreased 24 per cent as result of cultivation."

In another series of experiments "two tanks were irrigated by surface flooding to a depth of 6 in., two given the same amount of water applied in furrows

3 in. in depth, two in furrows 6 in. in depth, and two in furrows 9 in. in depth. All were given a 6-in. cultivation. The average loss by evaporation during 28-day periods was as follows: From the surface-flooded tanks, 0.985 in.; from the 3-in. furrows, 0.94 in.; from the 6-in. furrows, 0.72 in.; and from the 9-in. furrows, 0.6 in."

The water-raising capacity of soils, P. S. Kossovich (*Dnevn. XII. S''i͡ezda Russ. Est.-Isp. i Vrach* [*Moscow*], *p. 634; abs. in Zhur. Opytn. Agron.* (*Russ. Jour. Expt. Landw.*), *11* (*1910*), *No. 5, p. 734*).—Experiments with air-dried sand, loess clay, and moor clay soils were undertaken to study the height and velocity of the rise of water and the influence of readily soluble salts on these phenomena. Glass tubes 3 cm. in diameter were filled with the sifted soils. The sand contained 0.77 per cent of fine silt and clay particles, the loess clay 25.89 per cent, and the moor clay 27.05 per cent. The rise of distilled water, of a decinormal solution of common salt, and of a decinormal solution of sodium carbonate was observed.

The greatest height, 291 cm., was obtained in the loess clay with the solution of common salt. After the first 24 hours the water rose 82 cm. in the sand, 30 cm. in the loess clay, and 21 cm. in the moor clay. After 100 days the respective heights were 182 cm., 172 cm., and 106 cm., and at the end of 17 months 220, 280, and 169 cm. The influence of the salts was not marked on the sand but more pronounced on the clays. Common salt hastened the rise of the water while sodium carbonate impeded it.

Lysimeter experiments, S S. Peck (*Hawaiian Sugar Planters' Sta., Agr. and Chem. Bul. 37, pp. 5–38, charts 3*).—This bulletin reports the results of 2 series of lysimeter experiments to study the effect on the formation of nitric nitrogen of various forms of lime on acid wet mauka (upland) soil, and of various fertilizer salts alone and in combination on an alkaline dry makai (lowland) soil. Mechanical, chemical, and bio-chemical analyses of the soils used are reported.

In an upland soil which was rich in organic matter, poor in soluble lime and potash, and acid to litmus, "calcium additions as oxid, carbonate, or sulphate, increase the nitrification of the soil nitrogen or nitrogen added as sulphate of ammonia. Calcium additions as oxid, carbonate or sulphate, increase the amounts of lime and potash soluble in water and recovered in the drainage. Calcium sulphate was more effective in all three respects than calcium oxid or carbonate. The acidity of the soil did not seem the controlling factor as regards nitrification, the water-soluble calcium seemed of greater significance. Fertilizing with water-soluble phosphoric acid and sulphate of potassium produced a slight increase in the nitrification of ammonium sulphate. Any increase in nitrification was generally accompanied by an increase in lime in the drainage."

In a lowland soil containing a moderate amount of organic matter, rich in soluble calcium, and alkaline to litmus, "additions of fertilizing materials, as double superphosphate, tricalcic phosphate and sulphate of potassium, increased the amount of nitric nitrogen formed from the soil nitrogen. The best results in this respect followed the use of double superphosphate or tricalcic phosphate. A decrease in nitrification resulted from the use of potash and phosphoric fertilizers in lysimeters to which nitrogen as ammonium sulphate was added. The greatest depression in this respect followed the addition of double superphosphate. Liming with caustic lime depressed greatly the amount of nitric nitrogen obtained from sulphate of ammonia. No difference was observed between the nitric nitrogen in the drainage obtained from equal applications of nitrogen as sodium nitrate and calcium nitrate. Both nitrate fertilizations yielded less nitric nitrogen in the drainage than was obtained from an equal amount of nitrogen as ammonium sulphate."

Fertilizer experiments, C. C. Georgeson (*Alaska Stas. Rpt. 1910, pp. 33, 34, 49, 50*).—This is a brief account of fertilizer experiments on barley and oats at the Rampart Station.

"The fertilizers were sodium nitrate, superphosphate, potassium sulphate, and stable manure, each plat being compared with an unfertilized plat seeded with the same variety of grain and in the same manner. The result shows that when the three important elements of plant food are mixed in proper proportion the yield is better under normal conditions than when only one of them is used, and the variations which always occur in field fertilizer experiments also occur here. The important point is that the soil needs fertilization. It has been mentioned in former reports that whenever the brush and moss and dead vegetation of all kinds which cover the surface have been thoroughly burned then the soil usually yields a large first crop, but whenever, on the other hand, the surface has not been well burned the crop is usually poor [E. S. R., 23, p. 103]. There are two reasons for this; one is that the ashes which result from the burning are a valuable fertilizer in that they furnish plant food immediately available, and the other reason is that when the burning is not well done much of the moss remains, which makes the soil acid, and the acid is a poison to the crop. Now, it has been demonstrated in these experiments that even though there has been a thorough burning, followed by a heavy yield, the fertility which resulted from the added plant food in the ashes soon becomes exhausted, and to continue with good crops fertilizers must be added.

"Alaska soils are not rich. Frequently statements from travelers and other observers are seen to the effect that the soil must be exceedingly rich in plant food to judge from the height of the grasses and the luxuriance of some of the vegetation, but such a conclusion is not warranted. Grasses will sometimes grow rank on an almost barren gravelly soil because they have plenty of moisture and they are adapted to the climate and to the conditions. The virgin soil in the interior is everywhere frozen to an unknown depth or to bedrock. In this state of refrigeration there can be no activity of the organisms which aid in the formation of mold and the manufacture of plant food from the organic matter, and what plant food the soil may hold is in a large degree insoluble, and therefore not available for plants except by a long and slow process of weathering. For this reason the soil soon becomes exhausted, and fertilizers are necessary.

The law of the minimum and its applications, E. A. Mitscherlich (*Landw. Vers. Stat., 75 (1911), No. 3-4, pp. 231–263; abs. in Ztschr. Angew. Chem., 24 (1911), No. 37, p. 1776; Chem. Zentbl., 1911, II, No. 14, pp. 1056, 1057*).—Reviewing the results of pot experiments by Wagner and others, as well as of a series of sand cultures carried out by the author according to the Hellriegel method, the conclusion is reached that the law of the minimum is a logarithmic function and can not be established by fertilizer experiments as ordinarily carried out. The more exact sand culture method of Hellriegel is necessary for this purpose.

The use of artificial and chemical manures [on tea] (*Indian Tea Assoc., Sci. Dept. Quart. Jour., 1911, No. 2, pp. 5–14*).—This article discusses the fertilizing of tea with the various materials available for this purpose in Assam.

Effect of fresh and well-rotted manure on plant growth—second report, E. B. Fred (*Virginia Sta. Rpts. 1909–10, pp. 142–158, pl. 1, figs. 7*).—In continuation of previous experiments (E. S. R., 21, p. 418) it was found that "denitrification is most active when fresh manure is applied just at time of seeding. Very little, if any, harmful effect from denitrification could be observed in the second crop. In a clay soil the second crop seems to have been helped by the addition of fresh manure. In a loam and sand mixed the fresh manure acts in about the same way. In wood humus pure cultures of *Bacillus denitrificans* seemed to have a slight harmful effect, even in the second crop.

"The growth of well-inoculated legumes did not seem to be affected in any way by the presence of denitrifying bacteria. Fresh manure, whenever applied to soy beans, showed an increase in yield. This increase in yield was most prominent in a clay type of soil.

"All the samples taken from different types of soil used had the power to destroy nitrates when transferred to Giltay and Aberson's culture media. The power of destroying nitrate was most prominent in soils to which fresh manure was applied and least where well-rotted manure was applied. An increase in the number of bacteria per cubic centimeter was generally followed by a decrease in yield. The harmful effect of fresh manure was most apparent when applied to open, sandy soils.

"Carbon bisulphid apparently stimulates plant growth in a very active manner. The use of carbon bisulphid caused an increase in yield of almost 100 per cent.

"Heavy applications of fresh manure in a clay loam caused a marked falling off in yield.

"Laboratory studies show that *B. denitrificans* grows rapidly on almost any culture medium; on Giltay and Aberson's under aerobic conditions. It converts the citrate into carbonate, thus producing an alkaline reaction. Within 14 days, at a temperature of 30° C., *B. denitrificans* will liberate virtually all of the nitrate that may be present in a Giltay and Aberson's culture medium. On solid media containing large amounts of nitrate *B. denitrificans* grows luxuriously and the gas evolved splits the agar or gelatin. This is best seen on glucose formate agar. *B. denitrificans* forms two soluble enzyms—oxidase and peroxidase."

The loss of nitrogen from thin layers of manure on the soil, J. Jännes (*Diss. Hanover, 1910; abs. in Zentbl. Agr. Chem., 12 (1911), No. 8, pp. 521–528*).—The observations here reported were made on manure spread on soil in open and closed glass dishes.

The results in both series of experiments show that the loss of ammonia depends to a large extent upon the stage of decomposition of the manure. When the manure contained a large amount of ammonia the loss was quite large when the manure was spread on the soil. When the manure was kept moist after being spread on the soil the loss of ammonia was insignificant.

The availability of the insoluble nitrogen in certain commercial fertilizers, B. L. Hartwell and F. R. Pember (*Jour. Indus. and Engin. Chem., 3 (1911), No. 8, pp. 584–586*).—The availability of the nitrogen of the water-insoluble residue of 12 brands of commercial fertilizers was compared with that of dried blood and nitrate of soda in pot experiments with a succession of oats, millet and oats. Determinations of the availability of the nitrogen by the neutral permanganate of potash method are also given.

The results show that in these fertilizers, which were of high grade, the availability of the water-insoluble nitrogen was practically equal to that of dried blood and that the results by the potassium permanganate method agreed quite closely with those of the pot experiments.

Preliminary investigations on the preservation of lime nitrogen in the Tropics and the changes in form which it undergoes, C. J. Milo (*Meded. Proefstat. Java-Suikerindus., 1911, No. 11, pp. 311–636; Arch. Suikerindus. Nederlandsch-Indië, 19 (1911), No. 29, pp. 983–1035; abs. in Chem. Abs., 5 (1911), No. 22, pp. 3714, 3715*).—This article reports the results of experiments during 1910 to determine the water-soluble nitrogen, hygroscopicity, and changes in form of lime nitrogen under Java climatic conditions. The sample experimented with contained 50.89 per cent calcium cyanamid and 17.8 per cent nitrogen.

It was found that from 91.2 to 94.2 per cent of the nitrogen was soluble in water. The gain in weight when exposed to the air in thin layers was from 30.3 to 45.3 per cent and the loss in nitrogen from 1.3 to 2.6 per cent. A chemical study indicated the formation of the following products in the stored material: Monobasic calcium cyanamid ($Ca(CNNH)_2$); dibasic calcium cyanamid ($CNN(CaOH)_2$); calcium cyanamido carbonate ($CaC_2N_2O_2$); cyanamid (H_2CN_2); dicyandiamid ($H_4C_2N_4$); urea (H_4CON_2); unidentified nitrogen compounds; ammonium carbonate ($(NH_4)_2CO_3$); and ammonia (NH_3).

In warm, damp climates, like that of Java, which favor the decomposition of lime nitrogen the author recommends that the product be purchased as shortly as possible before using, that it be stored in a dry place, and that as little surface as possible be exposed to the air.

The production of sulphate of ammonia in the year 1910, C. G. Atwater (*Amer. Fert., 35 (1911), No. 6, pp. 21–27*).—Statistics of production are given and the status of the industry during 1910 is discussed.

It is stated that the world's production of ammonium sulphate during that year was 1,052,068 metric tons (of 2,204.6 lbs.). Of this England produced 374,925 tons, Germany 373,000 tons, and the United States 105,143 tons. Of the total recoverable ammonia England actually recovered 57 per cent, Germany 93 per cent, and the United States 17 per cent. England and Germany lead the United States not only in the proportion of recoverable ammonia which they save but also in the rate at which this figure is increasing. "The United States cokes nearly as much coal as both countries put together, yet produces less than one-sixth as much ammonia, and has to import sulphate to make up this deficiency in part in order to satisfy the demands of agriculture."

The chemical constitution of Thomas slag, L. Bernardini (*Rend. Soc. Chim. Ital., 2. ser., 2 (1910), pp. 133–135*).—This is a brief discussion of this subject, based mainly upon the work of others.

Note on the occurrence of manganese in soil and its effect on grass, F. B. Guthrie and L. Cohen (*Jour. and Proc. Roy. Soc. N. S. Wales, 43 (1909), No. 4, pp. 354–360*).—This has already been noted from another source (E. S. R. 23, p. 720).

The function of manganese as a fertilizer, L. Bernardini (*Rend. Soc. Chim. Ital., 2. ser., 2 (1910), pp. 135–137*).—This is a brief discussion of this subject, based mainly upon the work of others.

Mineral resources of the United States, calendar year 1909.—Part II, Nonmetallic products (*U. S. Geol. Survey, 1911, pp. 942, figs. 6*).—This is the usual detailed report on this subject. The chapters of greatest agricultural interest are those relating to lime, gypsum (E. S. R., 25, p. 218), and phosphates (E. S. R., 25, p. 217). In these articles the statistics are brought up to the close of the year 1909.

It is stated that the total production of lime in 1909 was 3,472,852 tons, of which 595,517 tons valued at $1,630,653, was used for fertilizing purposes, and 1,904,863 tons valued at $8,390,353, was used for building purposes. A detailed classification of the chemical uses of lime is given.

Fertilizers, R. E. Rose and L. Heimburger (*Fla. Quart. Bul. Agr. Dept., 21 (1911), No. 3, pp. 74–84, 91–101*).—The laws and regulations controlling the inspection and sale of mixed fertilizers in Florida are given, with notes on valuation and tabulated analyses of 208 samples of fertilizers examined during the year 1911.

Analyses of fertilizers and cotton-seed meal, fall season, 1910, and spring season, 1911, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 32 (1911), No. 8, pp. 157*).—This bulletin contains analyses of fertilizers and cotton-seed meal collected by the fertilizer inspectors of the state department of agriculture during the fall of 1910 and spring of 1911, as well as a list of brands of fertilizers registered for sale in 1911.

AGRICULTURAL BOTANY.

An introduction to vegetable physiology, J. R. GREEN (*London, 1911, 3. ed., pp. XXII+470, figs. 182*).—This new edition is the result of 10 years' experience with the older work and embodies many changes in the text. Parts of the book have been rewritten to incorporate the results of recent investigations, and other parts rearranged, to the manifest advantage of the method of treatment. This is especially true of the chapter on the energy of plants, which now includes the material formerly discussed under respiration. An attempt has been made to correlate more closely the structure of plants with their physiological needs and to consider their general relations to environment. The fundamental idea of the book is the plant as a living organism having certain properties and powers, and how it meets its requirements.

Investigations on the rôle of fats in the lower plants, J. DUBAQUIÉ (*Mém. Soc. Sci. Phys. et Nat. Bordeaux, 6. ser., 5 (1910), No. 1, pp. 51–138, dgms. 2*).—This is a detailed account of investigations on the physiological rôle of fats in molds and other plants, a preliminary account of which has been previously noted (E. S. R., 20, p. 735).

Studies of variation in plants, H. H. LOVE (*New York Cornell Sta. Bul. 297, pp. 593–677, figs. 70*).—The results are given of a study made to determine the extent to which fluctuating variability is influenced by environmental factors and especially by food supply. The data presented are those secured in a study of 2 generations of peas, 2 varieties of buckwheat, and 1 crop of corn.

In general the means were found to increase as the fertility of the soil was increased. The standard of deviation showed an increase in most cases as the food supply was increased. The coefficients of variability were affected differently for different characters. In about one half of the characters studied the coefficient was increased, while in the other half it was decreased. Certain characters of a species or variety were found much more variable than others. The coefficients of correlation in general decreased as the food supply was increased.

The results obtained in this investigation led the author to think that there is a greater degree of variation and a lesser degree of correlation among plants grown on very rich soil. The data given are not held to prove this conclusion, but rather are offered as evidence in favor of it.

A brief bibliography of this subject is appended.

The F_1 heredity of size, shape, and number in tomato leaves.—I, Seedlings. II, Mature plants, B. H. A. GROTH (*New Jersey Stas. Buls. 238, pp. 38, pls. 9, figs. 8; 239, pp. 12, pls. 9*).—In these bulletins descriptions are given of the grosser characters which distinguish the foliage of a number of types of tomatoes, and a report is made on the heredity of such characters in the first generation. This is in continuation of a series of studies previously reported (E. S. R., 23, p. 528).

The author found that the leaves of tomato types differ in many characters of size, shape, and number, in the cotyledons, first leaves, and large leaves. Practically all characters studied tend to exceed the mean between the values of the parents in the F_1 of the cross, the leaves of the cross tending to be longer, narrower, and to possess a greater number of segments than the mean between the parents or than either of the parents themselves. In other words, the crosses tend to be more vigorous than the parent plants. The combination of the same two characters in different crosses may or may not produce the same results in the F_1 of the crosses, while reciprocal crosses frequently differ in the young plants, but more rarely in the old plants, in respect to the heredity of characters of size, shape, and number. The size and probably the shape of the seed of the female parent is found to produce an effect on the heredity of size and shape, in the F_1, of the cotyledons, which may or may not extend to the first leaves. The dwarfs react in the character of size in the F_1 crosses, as if they had larger cotyledons.

The infection of root hairs by means of Bacillus radicicola, E. B. FRED (*Virginia Sta. Rpts. 1909–10, pp. 123–137, figs. 36*).—A description is given of the method of infection of leguminous plants by *B. radicicola*, the author showing that after entrance is gained into the root hair the tubercle bacteria multiply rapidly, forming a thread-like growth from the point of infection along the hair into the inner cells. The course of infection is not marked by a well-defined tube, as some authors have described, but by the infecting strand in which the separate bacteria can be distinguished. The course of infection is generally along the center of the root. Soon after infection a conical mass of cells is formed, which develops into the tubercle and pushes out the overlying cortical parenchyma and epidermis. Though the cortical cells are somewhat compressed, the epidermis is not ruptured nor does the tubercle burst out of the side of the root. Older tubercles sometimes appear as though formed exogenously, but if their development is carefully traced it will be found that they were formed endogenously.

Studies were made of 4 separate species of leguminous plants to determine the variation in the shape and size of the bacteroids. These forms are described, and the author considers them stages in the development of the bacteria and not degeneration nor transformation forms. In the development of the bacteroids the author noticed that certain portions were not stained by the ordinary methods and these are considered as being vacuoles. This is also believed to be a definite period of growth and not a sign of polymorphism of the bacteroid.

The plants representing different periods of growth as well as the organism causing the root tubercles are figured and described.

FIELD CROPS.

[Field crops experiments in Alaska], C. C. GEORGESON ET AL. (*Alaska Stas. Rpt. 1910, pp. 14–16, 31–33, 36–40, 44–49, 50–52, 54–58, 62, 63, pls. 9*).—At the Sitka and Rampart stations sprouted potatoes yielded much more abundantly than those not sprouted. At the Rampart Station the 6 best varieties are the following: Extra Early Triumph, Extra Early Eureka, Extra Early Pioneer, Gold Coin, Irish Cobbler, and Early Ohio. At the Fairbanks Station 11 acres were planted to potatoes but only 3½ acres, on newly cleared birch land on a hillside with a southern exposure, gave satisfactory yields. The 3 varieties giving the highest yields are Eureka, Gold Coin, and Red Early Ohio. Gold Coin is mentioned as among the highest yielding varieties at all these stations.

At the Rampart Station attempts are being made to secure an earlier and higher yielding barley by crossing. Kharkov winter wheat came through the winter with a 90 per cent stand and matured a fair crop. All the varieties of winter rye so far tried have lived through the winter and matured grain, but winter emmer and barley did not give satisfactory results. Nearly all the varieties of spring barley tried ripened before frost occurred. A description is given of each of the different varieties of barley grown and data show the results of various crosses made. Tabular statements are given comparing the adaptability of the various oat and winter wheat varieties grown and also the growth and hardiness of certain grasses and legumes. All of the grasses and legumes grown survived the winter in excellent condition. Timothy survived the winter in perfect condition but the summer's growth was short and spindling. Oat hay at Calsinsky Bay and Kodiak yielded 1½ and 2½ tons respectively per acre.

At the Fairbanks Station the following grains matured: North Finnish Black oats, oats No. 637, and Sixty-day oats. Barleys which matured are Hansen No. 279; Manshury; barley No. 19,851, a beardless and hull-less variety; barley No. 19,852, also a beardless variety; and even Hannah, a two-rowed rather late barley matured on a favorably situated plat. Spring wheat was a failure, but winter wheat was more successful. Kharkov winter wheat survived the winter with a 50 per cent stand and was ripe by August 15. Winter rye No. 19,556 survived the winter in better condition than wheat and was ripe by August 10. Experiments with grasses have so far proved unsatisfactory.

The proper culture of grain and the maintenance of soil fertility in Alaska are also discussed.

[Guam forage crop and grain storing experiments], J. B. THOMPSON (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1910, pp. 505, 506, 507–509, pl. 1, fig. 1*).—At the Guam Station the sorghums have surpassed all other crops under observation for forage purposes. Kafir corn on new soil has yielded about 7½ tons of green feed per acre. The first crop was obtained in about 3 months during the dry season, but 2 successive ratoon crops at intervals of about 6 weeks produced about as great yields. Guinea grass (*Panicum maximum*) made little headway on poorly drained soil during a wet season, but yielded 12 tons per acre on soil lower in fertility, after the roots had been taken up and subdivided. Johnson grass (*Sorghum halepense*) made a satisfactory growth, but showed its usual tendency to spread. Large water grass (*Paspalum dilatatum*) gave excellent results throughout both the wet and dry seasons and did well on poorly drained soil during long periods of heavy rainfall. Alfalfa did well during the dry season but its success during the rainy season is still undetermined. Cowpeas and velvet beans have also made a good growth.

A description is given of an air-tight metal tank, hermetically sealed by a heavy oil such as coconut oil, for storing grain. The problem is to avoid injury from weevils and atmospheric moisture. Corn stored in such a tank December 16 showed no deterioration 6 months later.

[Nebraska field crops experiments] (*Nebraska Sta. Rpt. 1910, pp. IX–XIV, XX–XXIV, XXV, XXVI*).—Data obtained during the year are reported.

In a test of the water requirements of corn, narrow-leafed types selected from Hogue Yellow Dent proved more drought-resistant than broad-leafed types of this variety. During 1908–9 plants averaging 1,300 and 992 sq. in. in leaf area yielded 43.6 and 52.1 bu. of corn per acre, respectively.

Since 1903 the produce of selected Turkey Red winter wheat plants has been kept separate, being compared for 4 years under nursery conditions, and a like period in the field. Of the 26 strains tested in the field the lowest 3 averaged 30 bu. per acre, the best 3 averaged 40 bu., and the check plats of the original wheat 35 bu. Eleven years' results indicate that practically equal yields of wheat follow plantings of the lightest and heaviest seed as separated by the fanning mill. Six years' work with oats gives similar results. The lightest fourth of the light seed and the heaviest fourth of the heavy seed were used.

Studies as to the competition of cereals indicate that "a larger percentage of plants originating from shrunken seed than plump seed are crowded out." This indicates the importance of natural selection in maintaining vigor and yield.

In a test of 16 varieties of corn Hogue Yellow Dent and Leaming produced 8,580 and 7,155 lbs. of dry matter per acre, respectively, these being the highest yields.

The amounts of organic matter and nitrogen added to the soil by alfalfa and clover roots were determined. In 1 field 2.3 tons per acre of organic matter were added by the first 8 in. of alfalfa roots, and 0.9 ton by the 3 in. stubble. Another field contained 3 tons per acre of organic matter in the first foot of soil, containing 125 lbs. of nitrogen, and another field 1-year old 2 tons of organic matter and 72 lbs. nitrogen. A clover field sown in the spring showed in August 1.25 tons of organic matter in the roots and 44 lbs. of nitrogen, and 2.25 tons of organic matter and 137 lbs. of nitrogen in the tops. An old alfalfa field showed 2.55 tons of organic matter and 105 lbs. of nitrogen per acre in the first foot of soil, and 2.05 tons of organic matter and 65 lbs. of nitrogen in the next 10 ft.

Five crops of winter wheat produced on summer tilled land at the North Platte substation show that "a fair average of wheat planted at the proper time and of the standard variety is 46.7 bu. per acre. This is 6 bu. more than twice the yeld from land not summer tilled."

Two common spring wheats have averaged 20.96 bu. per acre or 2 bu. less than the 4 leading durum varieties during the past 4 years. Among oat varieties Kherson held first place without a close rival until 1908 when the Burt oat was introduced. Since that time the yields have been about equal. Common six-rowed barley averaged 39 bu. per acre on summer tilled land as compared with from 20 to 25 bu. on land continuously cropped. It has proved the best variety for this region.

On disked corn fields oats yielded 38.6 bu. per acre, barley 35.3, emmer 34.9, durum wheat 23.4 and hull-less barley 18.4 bu. during the past 4 years. As compared with broadcast seeding and harrowing "drilling has increased the yield of spring wheat 7.4 bu. per acre, of barley 7.7 bu., of oats 10.3 bu. and of emmer 10.8 bu."

During the past 6 years from 10 to 35 varieties of corn have been tested with an average yield of 25 bu. per acre and a range from almost a failure to 52 bu. per acre. Substation Calico, a medium-size corn, may be considered one of the best.

A brief progress report of rotations and tillage methods indicates that summer tillage has increased the yield of spring grain but not sufficiently to warrant urging its general adoption. It has more than doubled the yield of winter wheat. Corn has usually yielded more heavily with continuous cropping but in 1910 it yielded 2½ times as much on summer tilled land as on any of that continuously cropped.

Soil moisture studies indicate that the moisture content may be increased to an indefinite depth depending on the character of the soil, precipitation, and tillage. Water to the amount of 6 or 8 acre inches may thus be accumulated.

Alfalfa growing is discussed and directions are given for securing a sorghum crop.

[Nevada field crops experiments], P. B. KENNEDY and G. H. TRUE (*Nevada Sta. Bul. 73½, pp. 19, 20, 29–31, 33–35*).—A brief progress report of alfalfa investigations precedes short histories and descriptions of *Medicago ruthenica*, S. P. I. 24,451; *M. falcata*, S. P. I. 23,625; Grimm alfalfa, S. P. I. 25,102; Old

Frankish lucern, S. P. I. 25,022; sand lucern from France, S. P. I. 23,894; Montana, S. P. I. 23,454; and Elche, S. P. I. 22,784.

A list is given of the species and varieties of clovers, mainly from California and Nevada, now being tested. Among the annuals *Trifolium amœnum* and *T. obtusiflorum* made the most vigorous growth and among the perennials *T. productum* and *T. wormskjoldii* are given special mention. *T. suaveolens*, S. P. I. 25,177, was well above ground and green within 3 days after planting and is recommended for trial in the southern part of the State.

Land plowed in 1907, left fallow during 1908, and seeded to Kubanka wheat in the spring of 1909, yielded 4 bu. per acre. The soil was a heavy clay not adapted to dry farming but representative of the foothill region of the Truckee Valley.

Two irrigations before heading and 2 after heading, aggregating 1.892 ft. of water, were followed by a higher yield of White Australian wheat, 40.5 bu. per acre, than were larger or smaller amounts of water differently applied. Similarly 82.2 bu. of Siberian oats followed 2 irrigations before heading and 3 after heading, aggregating 2.139 ft. of water. Approximately equal yields of Kubanka wheat, about 31.5 bu. per acre, followed applications of 1.447 and 0.767 ft. of water. Seven tons of alfalfa per acre were secured after an application of 2.186 ft. of water as compared with smaller yields from both smaller and greater applications of water. An application of 3.042 ft. of water was followed by a yield of 21.5 tons of roots per acre.

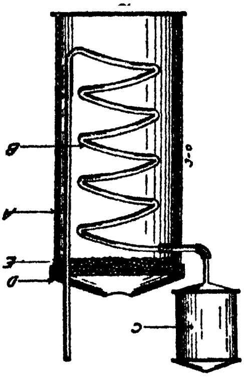

FIG. 1.—Diagrammatic section of potometer for studying transpiration of corn.

The utilization of logged-off land for pasture in western Oregon and western Washington, B. HUNTER and H. THOMPSON (*U. S. Dept. Agr., Farmers' Bul. 462, pp. 20, figs. 5*).—Discussions of the extent and need of utilization of logged-off land are followed by directions for burning over and planting such lands for pasture. The adaptability of each of a number of grasses, clovers, and pasture mixtures for this purpose is discussed and directions are given for seeding and managing the pasture. The use of Angora goats for killing brush is advocated.

Alfalfa at the Pennsylvania State College, F. D. GARDNER (*Pennsylvania Sta. Rpt. 1910, pp. 32–36, pl. 1*).—Continuing previous work (E. S. R., 18, p. 232), these pages state briefly the methods used in obtaining a stand of alfalfa on a small field at the station At 14 cuttings made during the 5 years 1905–1909, this field gave an "aggregate yield of 17.06 tons of air-dry hay per acre or an average of 3.41 tons per year."

A test of applications of lime, barnyard manure, nitrate of soda, dissolved rock, muriate of potash, and inoculated soil failed to indicate any advantage from the application of lime, but the field was found to have been limed not long before the date of seeding. No marked differences in results followed the use of the different fertilizers singly or in various mixtures.

The relation of climatic factors to the water used by the corn plant, T. A. KIESSELBACH and E. G. MONTGOMERY (*Nebraska Sta. Rpt. 1910, pp. 91–107, figs. 6*).—To study the relation of the water content of soils to plant growth and transpiration and of climatic factors to transpiration, corn plants were grown in large galvanized iron potometers (fig. 1) located in a cornfield and exposed to the general climatic conditions which prevailed in the field.

"The potometers were 3 ft. deep and 16 in. in diameter. Each contained the equivalent of 260 lbs. moisture-free silt loam soil. A 3-in. layer of gravel (E) served to prevent surface evaporation. Rain was excluded by means of a galvanized iron lid (D) having a 4-in. opening for the plant. This opening was covered with oil cloth, closely fastened about the cornstalk. Buried in the soil and connected at the top with a covered 6-qt. can was a spiral coil (B) made of ⅜-in. brass tubing 15 ft. in length and perforated every 8 in. All water was added through the small can (C) and distributed uniformly throughout the soil by means of the perforated coil. . . .

"Five different degrees of soil saturation were maintained throughout the growing season. This made 5 sets of 4 plants each, varying from 35 to 100 per cent saturated soil. Saturation was regarded as the amount of water retained by the soil after drainage ceased from water poured on the soil surface. It required 100 lbs. of water to saturate the 260 lbs. moisture-free soil in each potometer. The 5 degrees saturation maintained were 100 per cent, 80 per cent, 60 per cent, 45 per cent, and 35 per cent. . . .

"The daily transpiration was determined by loss in weight. The soil saturations were kept fairly constant by restoring, each evening, the exact quantity of water transpired during the day. When the loss was likely to be large, water was added twice each day.

"In connection with these transpiration determinations accurate records were obtained in the immediate vicinity by means of standard self-recording instruments of those climatic factors which were likely to affect the rate of water loss.

"The daily evaporation rate from a free-water surface was obtained by averaging the losses in weight from six 1-gal. glazed stone jars in which the water level was daily restored to 1 in. below the top of the jar. These jars were placed at different altitudes, ranging uniformly from the ground up to 10 ft. above the ground. By taking the average evaporation from free-water surfaces distributed in this manner, data were obtained which may be compared with the transpiration from corn plants, the leaves of which vary in their height above ground.

"In one experiment the evaporation rate was obtained by averaging the water loss from 5 Livingston porous clay cup evaporimeters.

"Comparative data were also secured as to the wind velocity in a cornfield at altitudes of 4 ft. and 10 ft. above ground."

It was found that "the optimum soil saturation for growth was from 60 to 80 per cent. The percentage of ear increased as saturation decreased down to 45 per cent, though the largest actual weight of ear was produced at 60 per cent and the greatest total dry weight at 80 per cent.

"Least water per gram dry weight was used in 45 to 60 per cent saturation. The percentage of leaf area to dry weight was least under the most nearly optimum conditions.

"When the hourly fluctuation in evaporation of free water was compared with the transpiration of a corn plant, they were found to fluctuate in almost perfect accord, the transpiration tending neither to lag nor to accelerate. This indicates that 'transpiration' is essentially 'evaporation.'

"Transpiration records for daily or weekly periods gave similar results up until the latter part of the season, when plants began to ripen. Then evaporation exceeded transpiration.

"The transpiration for the 12 hours of day was about 18 times greater than for the 12 hours of night."

Correlation studies of corn, E. G. MONTGOMERY (*Nebraska Sta. Rpt. 1910, pp. 108–159, figs. 4*).—The object of this investigation was to secure data on (1) the correlation between parts of the corn plant and the value of certain combinations of characteristics, (2) the modifications which take place in the corn plant as a result of a change in environment, and (3) the relations between the amount of water used, the leaf area, and the growth of the plant.

Observations were made on many individual plants during 1902 and succeeding years. Tables present data dealing with the following points: Leaf area, height of stalk and ear, number of nodes, ear nodes, length of shank, weight of stalk, ear, and total plant, ratio between weight of stalk and weight of ear, and ratios of leaf area to total weight, weight of ear, and weight of stalk.

It was found that when individual plants were considered there was no marked relation between leaf area and weight of corn produced or total weight of plant. In different varieties, however, there was quite a difference in the ratio of stalk to ear, the ratio being 0.74 in the case of Pride of the North and 1.15 in Hogue Yellow Dent. The amount of leaf area to 1 gm. of dry weight was also found to vary, ranging from 2.3 sq. in. for Minnesota No. 13 to 2.66 sq. in. in case of Hogue Yellow Dent.

Corn grown from Iowa seed was taller and made a larger stalk than that grown from Nebraska seed, in an acclimatization test.

Tables show the degree of correlation between the different parts of the corn plant.

The author draws the following conclusions in regard to useful characters under observation: (1) "A low relative leaf area seems desirable." (2) "Assuming high proportion of corn to be desirable, a short shank is preferable." (3) "Selection of high or low ears does not affect yield." (4) "Medium in stoutness of stalk would seem best."

Data given show that the relative size of plants was not transmitted to any degree, and the author states that variation in size of plant is not inherited but is due to some local cause, which indicates that size of plant is so modified by local conditions that potential qualities can not be judged from the individual. Taking plants as found under field conditions no characters have been found closely enough correlated to indicate ability to yield. The inherent characters can only be determined by a study of a sufficient number of progeny.

Data collected during a 3 years' test show the relation of water loss to leaf area and dry weight. The plants experimented with were grown in potometers under uniform conditions as to fertility, quantity of soil, and available water. The results show that in various types of corn the amount of water transpired by the plant is correlated to some extent with leaf area.

Genetic correlation and spurious allelomorphism in maize, R. A. EMERSON (*Nebraska Sta. Rpt. 1910, pp. 58–90, figs. 9*).—A discussion is given of color correlations in general showing that it is often very difficult to determine whether characters are genetically correlated or not. In crosses of varieties of green-podded, green-leaved beans with yellow-podded sorts also having green leaves, the F_1 generation had green pods and leaves and the F_2 generation showed typical Mendelian behavior, thus giving evidence that pod color and leaf color in beans are not genetically correlated. However, in another cross between the green-podded, green-leaved sort with a variety bearing "golden" leaves as well as yellow pods, the F_2 generation separated into 2 distinct classes, showing correlation.

Tables state the results of work done in trying to find correlated colors in maize. The F_1 generation plants were taken from the open pollinated parent and the data show the color of cob, pericarp, and in some cases of husks, silks, and anthers. The F_2 generation was selected from the self pollinated F_1 generation and gives similar data in regard to colors. "In every case but 4, included in the table, only 2 types occurred in the F_2. One type always had all the dominant colors of the parts in which the 2 types differed in color, and the other type all the recessive colors. There was apparently an absolute correlation (presumably a genetic correlation) between color of cobs, pericarp, husks, silks, and anthers."

Data are also presented showing spurious allelomorphism in maize and a few cases in which a dominant color of the cob is allelomorphic to a dominant color of the pericarp. The author considers that spurious allelomorphism occurs with respect to cob and pericarp colors in maize and bases his strongest evidence upon the gametic analysis of the F_1 plants made possible by crossing them with plants lacking genes of the characters concerned.

A comparison is made of genetic correlation and spurious allelomorphism and the relation of each to the way in which genes are associated in the gamete is discussed at length. Attention is called to the possible genetic correlation of sizes and other characters, in which there is noted an interesting case of correlation in maize between dwarfness and broad leaves, the presence of stamens throughout the ear, club-shaped tassels, and defective anthers. This correlation was observed in 3 families of corn in 1910. Considering the 3 families together there were 107 of the tall monoecious plants and 25 of the dwarf andromonoecious ones at the time the plants had finished their growth, thus showing definite correlation. In 2 of the families height characters were found to be sharply segregated

The author discusses his observations with respect to the possible behavior of the genes which represent the characters of maize in the chromosome.

Muslin screens to keep corn from crossing, L. CARRIER (*Virginia Sta. Rpts. 1909-10, pp. 119-123, figs. 4*).—These pages describe the method of construction of muslin screens used for the prevention of cross pollination of corn on adjacent experiment plats.

During 1908 the muslin partitions were 10 ft. high and the plats were roofed in, but with this method heat collected and weakened the stalks so that some of them broke of their own weight. In 1909 the same partitions were raised 3 ft. from the ground and no covering was used This method apparently did not weaken the plants and there was "little evidence of crossing of varieties—no more than we found in our isolated, pure bred plat."

During some of the heaviest gales, little indication of air currents inside the inclosure was observed. The author notes that there was no outside corn immediately adjoining the plats and believes that if there had been, pollen would doubtless have been blown over into the inclosure. Boone County White and Leaming were used and crossing would have been quite noticeable.

Göttingen oats, I, II, III, IV, O TORNAU (*Jour. Landw., 59 (1911), No. 2, pp. 137-184*).—This article describes with great detail the morphological characters of these different varieties of oats, originated at the Göttingen Experiment Station, and the characteristics of each variety of particular value to the farmer and plant breeder are also enumerated.

The sweet potato, B. H. A. GROTH (*Contrib. Bot. Lab. Univ. Penn., 4 (1911), No. 1, pp. 104, pls. 54*).—This work is a review of the historical records of *Ipomœa batatas*, made for the purpose of furnishing a working basis for future experimentation with its many varieties. A chapter each is devoted to the following topics: Origin and history, economic importance, the structure of *I. batatas*, and classification of varieties.

Summary of experiments in the culture of Sumatra tobacco under shelter, W. FREAR and E. K. HIBSHMAN (*Pennsylvania Sta. Rpt. 1910, pp. 238-243, pls. 2*).—After a discussion of the cultivation, harvesting, and cost of production of Sumatra tobacco under shelter, the authors conclude that its cost of production on a commercial scale ranges from 45 to 75 cts. per pound for cured leaf. A shelter tent experiment at Cocalico proves that a leaf can be produced which approaches the average imported Sumatra in color, luster, fineness of vein, wrapping capacity, and burn. A strain has been developed which is adapted to the Pennsylvania sandy loam and to the particular climatic growing conditions.

1909 experiment with Sumatra tobacco under shelter, E. K. HIBSHMAN (*Pennsylvania Sta. Rpt. 1910, pp. 236–238*).—Using the Greider strain of Connecticut Sumatra seed a crop of 377.5 lbs. of stripped leaf was produced in 1909 at a cost of $262.67. The cost of handling the cured leaf, sweating, sorting, losses of weight during the process and interest on the investment brought the net cost per pound in this unfavorable year to about $1.

Roumanian wheat, A. ZAHARIA (*Der Rumänische Weizen. Bucharest, 1911, pp. VIII+177, map 1*).—This is a controversial article with reference to the relative merits of Hungarian and Roumanian wheats. In connection with the discussions presented, considerable experimental data are given, mainly with reference to the crops for the years 1900–1908.

The eradication of quack grass, J. S. CATES (*U. S. Dept. Agr., Farmers' Bul. 464, pp. 11, figs. 6*).—Descriptions of the underground stems of quack grass (*Agropyron repens*) and of the varying development of these roots in cultivated fields, meadow lands, and pasture land are followed by directions for the eradication of the pest, either by plowing the sod in midsummer and disking about once in 10 days until fall or by disking alone.

HORTICULTURE.

[Horticultural investigations in Alaska], C. C. GEORGESON ET AL. (*Alaska Stas. Rpt. 1910, pp. 10–14, 16–29, 53, 58, 59, pls. 3*).—The work of greatest interest at the Sitka Station during the past year was the cultivation of hybrid strawberries (E. S. R., 23, p. 639). An increased number of promising varieties was secured. Thus far 166 out of 1,800 fruiting plants have yielded market-size fruit and 35 plants have produced larger berries than the average market variety. Crossing the cultivated forms with a native wild berry has, with a few exceptions, improved the flavor. This work is discussed and illustrations are given of a number of the hybrid types secured.

Notes are given on the condition and behavior of vegetables, orchard and small fruits, and ornamentals being tested at the station. The test orchard, consisting of a few trees each of a number of varieties of apples, as well as some cherries and plums, is making but slow progress. After several years of observation it seems probable that apples of any of the varieties now known and cultivated can not be successfully grown in any part of Alaska. Although cherries have made better growth than apples, nearly all of them blooming in the spring and in favorable seasons fruiting a little, it is considered doubtful whether they can be made to fruit in any part of Alaska when grown in the open. The plum trees are not yet large enough to fruit, but judging from their growth it seems probable that they will not be successful. Of the small fruits, currants, gooseberries, and red raspberries do well. Black raspberries and the blackberry are complete failures in Alaska. The hybrids between cultivated and native raspberries have thus far shown no improvement over the parents (E. S. R., 20, p. 143).

Of the ornamentals tested the Japanese rose (*Rosa rugosa*) is in the first rank and several varieties of the Tartarian honeysuckle are next in point of value. *Spiræa thunbergii*, *Berberis* sp., the red berried elder (*Sambucus pubens*), and the mountain ash, together with a number of perennial and annual flowering plants can be grown successfully.

Cultural tests of vegetables at the Rampart Station have shown that gardening in interior Alaska differs very little from gardening in any of the Northern States. Garden seeds from specially hardy or acclimated plants are unnecessary. Peas and cauliflower have been canned with success, thus demonstrating the feasibility of local supplies of canned vegetables for the long winter months. At the Fairbanks Station nearly all the hardy vegetables were grown and gardens in the vicinity produced the usual abundance of vegetables of the finest quality. One gardener raised 16 tons of cabbages on a half acre of highly fertilized soil. The average heads weighed about 16 lbs. and the largest 33 lbs.

[Report on vegetable experiments], J. B. THOMPSON (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1910, pp. 506–507*).—Experimental work with vegetables at the Guam Station, which was established in 1909, has thus far been confined to the introduction of various vegetables and to tests with a view to obtaining better varieties than those already grown. Among the vegetables which have been successfully grown are beans, eggplants, radishes, okra, peppers, lettuce, cucumbers, muskmelons, and watermelons. Beets grew quickly until about 2 in. in diameter when the leaves were destroyed by lepidopterous larvæ before their presence was noted. Cabbage has thus far failed to mature heads.

Melon culture, J. TROOP (*New York, 1911, pp. XII+105, figs. 22*).—A practical treatise on the principles involved in the production of melons, both for home use and for market, including a chapter on forcing and one on insects and diseases and means of controlling the same.

Peas and pea culture, G. C. SEVEY (*New York, 1911, pp. XI+92, figs. 17*).—A practical and scientific discussion of peas, relating to the history, varieties, cultural methods, and insect and fungus pests, and with special chapters on the canned pea industry, peas as forage and soiling crops, garden peas, sweet peas, seed breeding, etc.

Concerning the comportment of a hybrid race of peas, P. BACCARINI (*Nuovo Gior. Bot. Ital., n. ser., 17 (1910), No. 3, pp. 329–347; 18 (1911), No. 3, pp. 379–394*).—A study of character transmission in a hybrid obtained from the field pea pollinated with the garden pea.

The most important measures which have been undertaken during the past ten years for the development of fruit growing and fruit marketing in Bavaria, REBHOLZ (*Landw. Jahrb. Bayern, 1 (1911), No. 9, pp. 672–688*).—A summarized review of measures which have been employed to develop the fruit industry in Bavaria, including statistics of the fruit industry in Bavaria for the year 1910.

Fruit-bud formation and development, A. W. DRINKARD, Jr. (*Virginia Sta. Rpts. 1909–10, pp. 159–205, figs. 106*).—This comprises a study of the formation and development of fruit buds of the apple, plum, pear, peach, and cherry, started in 1908 and extended over a period of 2 years. The results of previous investigators are summarized. The methods employed in making microtome sections and micro-photographs are described in detail and the formation and development of the different types of fruit buds are shown in a series of micro-photographs with accompanying legends and discussions.

The principal stages observed in the life history of fruit buds were a prolonged period of formation during the summer, which began in the case of the Oldenburg apple during the last week in June, although the Whitaker plum, a *hortulana* variety did not form fruit buds until the first week in September. Development continues through the summer and fall and the flower parts are practically complete about November 1. During the winter months cytological changes are going on in the essential parts of the flowers. Rapid development of the floral organs again takes place during the few weeks previous to blossoming. The time of formation of fruit buds was found to be much more variable between different varieties of plums than between varieties of apples.

From a consideration of the data as a whole the following general conclusions as applied to orchard practice are deduced: "Buds which produce the crop of bloom for the current year are formed the preceding summer; initial fruit-bud formation has its beginning during June or July, depending on seasonal conditions and the kind of fruit. The proper development of the fruit bud would therefore be influenced by factors which are brought to bear upon the tree prior to and during the period at which fruit-bud formation takes place. In the practice of such orchard operations as are designed to influence or control fruit-bud formation, it appears that such operations should be more effective in the spring and early summer than at other stages of development."

Experiments in the pollination of our hardy fruits, C. H. Hooper (*Agr. Students' Gaz., n. ser., 15 (1911), No. 4, pp. 110–113*).—In a brief summary of his work conducted at Wye, Kent, the author finds that the gooseberry and red and white currants fruit well under self-fertilization. In support of observations made in this country, however (E. S. R., 21, p. 636), he finds that a majority of apples, pears, plums, and cherries require cross-pollination.

Pollination of Bartlett and Kieffer pears, S. W. Fletcher (*Virginia Sta. Rpts. 1909–10, pp. 213–224, figs. 14*).—As a result of his previous experiments and observations on the barrenness of orchards, the author found that a great many varieties of fruits, including the Bartlett and Kieffer pears, tended toward self-sterility and that, in general, orchard planting with reference to cross-pollination was advisable (E. S. R., 12, p. 237). In order to determine suitable pollenizers for the Bartlett and Kieffer pears and to some extent for other fruits, experiments were conducted under the direction of the West Virginia Station in 1903 and at the Michigan Station in 1906 and in 1907. The methods used with other technical details have appeared in a previous paper.[a] The present report, which summarizes the work as a whole, shows further evidence of the self-sterility of the Bartlett and Kieffer pears.

The results of hand pollinating over 8,000 Kieffer pear blossoms and about 10,000 Bartlett pear blossoms in the 3 years above mentioned show that self-sterility is the rule and that cross-pollination by insects is not general. The Anjou, Lawrence, Duchess, and Kieffer varieties proved to be satisfactory pollenizers for planting with the Bartlett, although in some seasons the Kieffer and Bartlett do not blossom simultaneously. LeConte, Garber, Lawrence, Bartlett, Duchess, Anjou, and Clairgeau were satisfactory pollenizers for the Kieffer. Although the five latter varieties do not blossom simultaneously with the Kieffer in certain years, the blossoming seasons usually overlap sufficiently.

The results of hand pollinating nearly 3,000 Gold Drop peach blossoms in 1906 showed no benefit to this variety from cross-pollination with St. Johns, Late Crawford, or Lewis. The self-fertilized fruits were perhaps a trifle superior.

The investigation as a whole has confirmed the author's previous conclusions relative to the desirability of mixed planting. No immediate effect of pollen and no differences obviously due to mutual affinity were discovered. The cross-fertilized fruits averaged about the same in size, shape, color, and quality regardless of the pollen used.

A new method of handling pollen, S. N. Green (*Amer. Breeders Mag., 2 (1911), No. 1, pp. 52–54, fig. 1*).—During the course of work in the pollination of a number of different fruits, the author has found that empty quinin capsules seem to meet the requirements under almost all circumstances for gathering and storing pollen and that they are convenient to use. The anthers of the desired parent are selected as near the bursting point as possible and scraped or cut into a capsule. In a few hours the anthers in the capsule burst and when shaken the pollen scatters around and adheres uniformly over the gelatine walls of the capsule from which it can be transferred to the stigma with the usual brush or thin-bladed knife. Pollen thus inclosed retains its vitality for a long time and the capsules may be mailed to distant points without trouble. Some difficulty was experienced with the pollen of some of the Cucurbitaceæ which seems to be very moist and sticky and does not readily separate from the anthers.

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[a] Methods of Crossing Fruits (Rpt. Soc. Hort. Sci., 1906, pp. 29–40). See also a previous note (E. S. R., 17, p. 1125).

Relative success of different grafts, J. P. Stewart (*Pennsylvania Sta. Rpt. 1910, p. 270*).—The ordinary whip graft on the limbs has been compared with the side graft on the trunks in a total of over 2,200 cases. The relative success of grafting trees just set as compared with trees established by one season's growth in the orchard was also noted.

The results show a percentage of 67.28 succeeding in case of the whip grafts and 70.63 with the side grafts; 55.65 per cent of the grafts on trees newly planted were successful as compared with 69.17 per cent on established trees. Since over half the grafts grew on the newly planted trees it appears to be good orchard practice to top-work the trees when first set and to work over the failures either by budding in August or by grafting in the following spring.

Frost fighting investigations, P. B. Kennedy (*Nevada Sta. Bul. 73½, pp. 21–24*).—An account is given of preliminary investigations in the use of orchard heaters, conducted in the spring of 1910, including a record of temperatures, notes on the condition of different varieties of apples, methods employed, and the time of blossoming of the different varieties of apples in 1909 and in 1910.

The district street plantations in Offenbach with special reference to fertilizer investigations, G. Biesterfeld and E. Lierke (*Deut. Obstbau Ztg., 1911, No. 17–18, pp. 271–300, figs. 43, maps 2*).—An account is given of the development and management of street fruit tree plantings in the district of Offenbach, together with an account of fertilizer experiments which have been conducted with these trees since 1896. These experiments, which are being continued, have shown for the few years which the trees have borne fruit that judicious application of a complete fertilizer will prove profitable. The use of any single nutrient has resulted in a loss.

Lime-sulphur on peaches, and in summer control of scale on apples, J. P. Stewart (*Pennsylvania Sta. Rpt. 1910, p. 268*).—In continuation of his studies of lime-sulphur sprays (E. S. R., 23, p. 266), the author has found that summer-strength lime-sulphur applied on June 22 and 30 and on July 11 against the young San José scale, which had emerged first about June 18, were thoroughly effective against the young in all cases and also that each spray very materially reduced the number of adults. No further emergence of young scales was noted and a thorough examination on August 20 failed to reveal any signs of living scales whatever. A similar experiment with an apple tree about 8 years of age and badly infested indicates that it is quite possible and practicable to control San José scale on apples by summer spraying alone, though 2 or more sprays will doubtless be required.

Some new data regarding the lime-sulphur wash, L. L. Van Slyke (*West. N. Y. Hort. Soc. Proc., 56 (1911), pp. 66–72*).—A summarized presentation of data previously reported and noted (E. S. R., 24, p. 663).

Some new fruits, N. E. Hansen (*South Dakota Sta. Bul. 130, pp. 163–200, figs. 13*).—In continuation of previous reports (E. S. R., 20, p. 239) the records of a number of promising hybrids secured in the author's breeding work with stone fruits are brought up to date. In addition to descriptive notes an alphabetical list is given of both the pure native plums and the new hybrid plums, showing the English meaning of the Indian names, pedigree, and year of introduction. Reference is also made to the work of improving native plums and sand cherries through selection.

Although sufficient time has not elapsed for a final report as to their relative value, the author gives as a guide to the fruit grower and nurseryman his estimate of the best varieties of each class of hybrids. These include varieties secured from the following crosses: Native plum×Chinese Apricot plum pollen, Japanese plum×De Soto plum pollen, and crosses of the western sand cherry with pollen of the Gold, Sultan, De Soto, Chinese Apricot, and Persian Purple-leaved plums.

Investigations on the mortality of plums, E. Rabaté (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), Nos. 33, pp. 197–202; 34, pp. 214–222*).—An investigation into the cause of the rapid dying out of plum trees in certain plantations of Lot-et-Garonne, France, is reported. The author concludes that the rapid mortality of the trees is caused either by asphyxiation of the roots in soil saturated with stagnant water or through the underground action of root rot, or by a combination of these causes, the former being more prevalent. Methods of treating this trouble adapted to different soil conditions are suggested.

Results of experimental plantings with grapes grafted on American stocks at the Wädenswil Experiment Station, H. Schellenberg (*Landw. Jahrb. Schweiz., 25 (1911), No. 4, pp. 277–288*).—The data here presented indicate that with the judicious selection of American stocks no serious difficulty will be encountered in the reconstitution of the vineyards in German-Switzerland.

American grape stocks of the varieties selected for further trial by the Prussian experiment stations, F. Schmitthenner (*Landw. Jahrb., 40 (1911), Ergänzungsb. 2, pp. 1–76, pls. 12, fig. 1*).—Detailed descriptions are given of 18 grape stocks, including pure American species and America-American and Franco-American hybrids which are considered worthy of further trial in the reconstitution of German vineyards.

Report of the grape grafting station Geisenheim-Eibingen, Fischer et al. (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1910, pp. 195–232, figs. 4*).—This report embraces a record of the grafted varieties in the experiment station, observations on the various graft stocks employed, notes on hybrids, grafting experiments, etc.

In a preliminary experiment in the use of Nitragin in the nursery soils, Nitragin in combination with phosphoric acid and potash gave the best results, and Nitragin used alone gave better results than the check plat.

Report on the activities of the Royal American Grape Nursery in Asti for the period 1901 to 1910, G. Persi (*Bol. Min. Agr., Indus. e Com.* [*Rome*], *10 (1911), Ser. C, No. 8, pp. 13–32, figs. 3*).—This consists of a review of operations conducted at the grape nursery established in Asti for the propagation, study, and dissemination of American vines. During the 10-year period under discussion over 2,000,000 grafted plants and over 200,000 cuttings consisting largely of Riparia and Rupestris, together with hybrids of these 2 species, have been distributed in various Provinces of Italy.

Report of the enological station of Haro for 1910, V. C. M. de Zúñiga (*Estac. Enol. Haro Mem., 1910, pp. 151, pl. 1*).—As in previous years (E. S. R., 28, p. [illegible]0) this report summarizes the progress made in laboratory and field investigations, assistance rendered, etc.

The viticultural conditions in Algeria, J. Wortmann (*Landw. Jahrb., 40 (1911), Ergänzungsb. 2, pp. 77–98*).—This comprises the results of an investigation of the grape industry in Algeria.

Storage test of shipping grapes, F. de Castella (*Jour. Dept. Agr. Victoria, 9 (1911), No. 8, pp. 531, 532*).—A number of varieties of shipping grapes packed in cork dust and stored in the Victoria cool stores at a temperature between 33 and 34° F. were found to be in from fair to good condition at the end of 3 months.

Coffee culture; its future in the French colonies, A. Jacotot (*La Culture du Café, son Avenir dans les Colonies Françaises. Paris, 1910, pp. 191*).—Part 1 of this work discusses the actual condition of production and consumption of coffee and the future of the coffee industry in the principal producing countries. Part 2 consists of a study of the actual conditions of the coffee industry in the various French colonies. It is concluded that the culture of coffee in conjunction with other products should be encouraged and that one of the best means to encourage the industry is to remove all taxes from coffee going from the colonies to the home country.

The pecan and hickory in Texas, E. J Kyle (*Texas Dept. Agr. Bul. 19. 1911, pp. 37, figs. 19*) —A popular treatise on pecan growing in Texas, based on observations made and data collected over a number of years.

[Report on ornamentals], P. B Kennedy (*Nevada Sta. Bul. 73½, pp. 25–29*).—Notes are given on the condition of a number of ornamental shrubs being tested at the station.

Chrysanthemums and how to grow them, I. L. Powell (*Garden City and New York, 1911, pp. 201, pls. 31*) —A popular work containing directions for the culture and care of chrysanthemums grown for outdoor bloom and for cut flowers under glass.

Indoor gardening, E. E. Rexford (*Philadelphia and London, 1910, pp. 318, pls. 33*).—A popular treatise on the culture and care of indoor plants.

FORESTRY.

[Report of the] department of forestry, J. A Ferguson (*Pennsylvania Sta. Rpt. 1910, pp. 300–307*).—A progress report for the year on forest nursery operations, experimental plantings of hardy catalpa, red oak, and black locust, tree seed storage, basket-willow experiments, and the treatment of fence posts and shingles with creosote.

Only 2.6 per cent of the hardy catalpa trees that were planted in 1908 were found to have a straight stem, late frosts having killed not only the terminal buds but the upper lateral buds as well. It appears probable that hardy catalpa will not prove successful in the upland region of Pennsylvania. The basket-willow experiments, which are being conducted in cooperation with the Forest Service of this Department, have shown so far that the varieties Welsh and Lemley are best suited for the severe climate in the vicinity of the station.

In the treatment of fence posts with creosote, the data given show that for chestnut posts a larger amount of creosote is absorbed by heating 4 hours than 3 hours when subsequently cooled for an equal length of time. After heating for a certain length of time in hot creosote, the length of time the posts are subsequently cooled in cold creosote affects the amount of creosote absorbed Posts cooled 4½ hours absorbed 0 8 lb. of creosote and posts cooled 12 hours absorbed 1.4 lbs. Oak posts of 3 varieties absorbed an average of 1.2 lbs. of creosote and the cost of treatment was 3.3 cts. Posts of Pennsylvania pitch pine absorbed 6.97 lbs. of creosote, thus raising the cost per post to 16.5 cts.

The results show that for each species of wood a formula should be determined which will show the length of time the posts should be heated in hot creosote and cooled in cold creosote to obtain the degree of penetration desired.

Preliminary report on forestry investigation at Colesborne, Gloucestershire, H. A. PRITCHARD, R. G. STAPLETON, and M. KERSHAW (*Ann. Sci. Bul. Roy. Agr. Col. Cirencester, 1910, No. 2, pp. 47–88, pls. 3, fig. 1*).—The investigation in question is being conducted by the Royal Agricultural College, Cirencester, to determine the causes of the extreme differences in the development of different species and even in the same species in a plantation on thin, poor, calcareous soils. The plantation is described and the experiments being conducted are outlined. They are to include studies of the action of various conditions of soil and climate, as well as such indirect agencies as aspect and contour on tree development.

Annual progress report on forest administration in the lower Provinces of Bengal for the year 1908–9, G. S. HART (*Ann. Rpt. Forest Admin. Lower Prov. Bengal, 1908–9, pp. II+50+3, map 1*).—Customary report relative to the constitution, management, silviculture, and exploitation of the state forests in the lower Provinces of Bengal, including a financial statement for the year. The more important data are appended in tabular form.

Annual progress report on forest administration in the lower Provinces of Bengal for the year 1909–10, F. TRAFFORD (*Ann. Rpt. Forest Admin. Lower Prov. Bengal, 1909–10, pp. II+48+2*).—A report similar to the above for 1909–10.

The forest re-formation and private ownership: A historical study, comparative law, new projects, L. DUCROT (*La Réforme Forestière et la Propriété Privée. Étude Historique-Droit Comparé, Projets Nouveaux. Lyon, 1910, pp. VII+335*).—In view of the growing interest relative to the administration, conservation, and extension of forest lands, the author has aimed to bring together the important literature on the subject having special bearing on French conditions.

Part 1 contains a historical sketch and analysis of French legislation from ancient times up to the present in its relation to private ownership. Part 2 contains a critical study of the forest laws of Italy. In part 3 the question of forest re-formation is presented, both from the standpoint of the Government and of the private invidiual, including various projects proposed for solving this question.

A bibliography on the subject is included.

Example of a German working plan, trans. by A. B. RECKNAGEL (*Forestry Quart., 9 (1911), No. 3, pp. 391–399*).—This comprises a summary of the methods of management which form a part of the Working Plan for the Tegernsee Forest in Bavaria, the manuscript of which is in possession of the Yale Forest School. The plan deals with a practically virgin forest of spruce with fir and beech in mixture, and it is suggested that it will be particularly applicable to similar conditions in America.

The need of a vigorous policy of encouraging cutting on the National Forests of the Pacific coast, B. P. KIRKLAND (*Forestry Quart., 9 (1911), No. 3, pp. 375–390*).—After analyzing the conditions and factors involved in the development of methods of cutting and regeneration in the National Forests of the Pacific coast, the author concludes in part that present cutting based on a sustained annual yield can, without any damage to the future, yield liberal revenues to federal and state governments and that all possible present revenue within a sustained annual yield basis, which is not taken, will be irrevocably lost. The forests, it appears, are covered for the most part with overmature stands in which the loss by decay offsets all growth. Clear-cutting methods must be practiced and artificial regeneration will be cheaper and probably better than natural regeneration from scattered seed trees.

A method of assessing fire damages in the Southwest, R. Rogers and B. Moore (*Forestry Quart., 9 (1911), No. 3, pp. 412–419*).—This consists of a detailed statement of a suggested method for finding the value of forest products destroyed by fire in the Southwest.

The Biltmore stick and its use on National Forests, A. G. Jackson (*Forestry Quart., 9 (1911), No. 3, pp. 406–411, fig. 1*).—The author has derived and here presents a formula which may be used for constructing an accurate scale on the Biltmore stick, an instrument which has recently been used to some extent in place of calipers or diameter tape in measuring diameters of large trees. Comparative measurements made with all of the above instruments indicate that the Biltmore stick has a practical value as a field instrument.

The climatic and hygienic influences of forest growth, J. M. Anders (*Med. Rec. [N. Y.], 80 (1911), No. 14, pp. 659–661*).—A paper on this subject read before the American Climatological Association, Montreal, 1911.

Experiments on ramming forest trees, H. A. Pritchard (*Ann. Sci. Bul. Roy. Agr. Col. Cirencester, 1910, No. 2, pp. 89–93, pl. 1*).—In 1909 a small number of trees of several species was planted at the college to ascertain whether the results obtained by Pickering in ramming fruit trees (E. S. R., 20, p. 1034) will be borne out in the case of forest trees. Four-year-old trees were used.

During the 2 years the trees were in the ground it was quite impossible to detect the rammed trees from those that were not rammed. The trees were then carefully lifted out and studied. The results appear to show that extreme care in digging holes and carefully spreading out the roots is not so important as packing the soil about the roots when the trees are planted. Except possibly for larger trees than are usually planted out for silvicultural purposes, however, the results did not seem to furnish any justification for the practice of ramming, provided that the soil about each tree is firmly trod upon after planting. The tests are being conducted on a larger scale.

Some useful woods of Kamerun.—II, Leguminosæ, H. Harms (*Notizbl. K. Bot. Gartens u. Mus. Berlin, 1911, App. 21, No. 2, pp. 9–75, figs. 23*).—The author has brought together the important information relative to a large number of timber trees of Kamerun belonging to the Leguminosæ. Under each species consideration is given to its botanical characteristics, anatomy of the wood, distribution, native uses, and importance to European wood industries.

Utilization of osage orange, H. Maxwell (*[1911], pp. 14*).—This pamphlet embraces the results of an investigation of the utilization of the osage orange, conducted cooperatively by the Forest Service of this Department and the farm wagon department of the National Implement and Vehicle Association. Data are given on the utilization of this wood for wagon parts, fence posts, bridge piling, house blocks, telephone poles, and miscellaneous products. Consideration is also given to the future supply of osage orange.

Although the natural range of osage orange covers about 10,000 square miles, the stands have been so greatly reduced that commercially the wood is now found in restricted patches and strips which grouped together would not exceed 400 square miles. It is concluded that a drain much smaller than the present annual cut of 26,000,000 ft. b. m. will speedily deforest the remaining areas. It is expected, however, that the rate of cutting will decline as scarcity increases.

The commercial mahoganies, P. Busch (*Tropenpflanzer, 15 (1911), No. 9, pp. 479–493*).—Descriptive notes are given of the commercial mahoganies, which are treated with reference to both their producing countries and their botanical classification.

Eucalyptus culture in Hawaii, L. MARGOLIN (*Bd. Comrs. Agr. and Forestry Hawaii, Div. Forestry Bul. 1, 1911, pp. 80, pls. 12*).—This embraces the results of a study of eucalyptus plantations in Hawaii, conducted cooperatively by the Forest Service of this Department and the Territorial Board of Agriculture and Forestry. The object of the report is to put before landowners in Hawaii comprehensive suggestions and definite recommendations in regard to growing and managing eucalyptus forests.

The important phases discussed include physical requirements, habit of growth, enemies, uses of eucalypts, establishment, care, and management of eucalypts, growth, yield, and financial returns, and forest management for sugar plantations.

An appendix contains notes on the character and uses of various species of eucalypts in Australia, classification of species by size, lists of eucalypts planted in Hawaii, a bibliography on eucalypts, and field notes on the trees found planted in Hawaii.

A manual for eucalyptus planters, E. NAVARRO DE ANDRADE (*Manual do Plantador de Eucalyptos. Sao Paulo, 1911, pp. VI+343, figs. 183*).—Part 1 of this manual, which has special reference to the culture of eucalypts in Brazil, treats of the climatic and soil requirements of eucalypts, methods of reproduction, planting operations, culture and management of eucalyptus stands, protection from insects and other enemies, cost, yields, returns, etc., timber and other products, and methods of regeneration. Part 2 takes up the various species of eucalypts relative to their botany, distribution, products, and behavior under cultivation.

Guayule (Parthenium argentatum): A rubber plant of the Chihuahuan Desert, F. E. LLOYD (*Carnegie Inst. Washington Pub. 139, 1911, pp. VIII+213, pls. 46, figs. 20*).—This work embraces the results of investigations conducted with guayule by the author for a number of years with the view of developing a successful method for growing this desert rubber plant. Introductory remarks deal with the discovery of guayule, the development of the rubber industry, and cultural attempts. In the succeeding chapters guayule is discussed in detail relative to its environment, morphology, reproduction, anatomy and histology, the resin canals, the origin and occurrence of rubber, vegetative reproduction, and conclusions relative to the methods of growing and possibilities of guayule under forestal or under cultural treatments.

A bibliography is appended.

Treatment of shingles with creosote to increase their durability, J. A. FERGUSON (*Pennsylvania Sta. Rpt. 1910, pp. 308–310, pl. 1*).—An account is given of experiments conducted during the past year to determine the practicability of utilizing for shingles inferior and perishable woods treated with creosote, and to determine the amount of creosote absorbed by a bundle of shingles.

The shingles chosen for the experiment were of loblolly pine, Pennsylvania pitch pine, and chestnut. They were treated by the open-tank process. The chestnut shingles absorbed 17.1 lbs. of creosote per bundle at a cost of 45.5 cts. Pennsylvania pitch pine absorbed 15.5 lbs. of creosote per bundle at a cost of 41.7 cts., and loblolly pine shingles 11.3 lbs. of creosote per bundle at a cost of 32.5 cts. These shingles, together with western cedar, redwood, and untreated chestnut shingles, are to be tested for durability over a term of years.

DISEASES OF PLANTS.

Notes on plant diseases occurring in North Carolina, F. L. STEVENS and J. G. HALL (*North Carolina Sta. Rpt. 1910, pp. 59–72, figs. 5*).—Notes are given on a number of plant diseases reported from different parts of North Carolina, most of them being on fruit, field, and garden crops.

Plant diseases in Virginia in the years 1909 and 1910, H. S. REED and J. S. COOLEY (*Virginia Sta. Rpts. 1909–10, pp. 99–119, figs. 13*).—The results of a plant disease survey of the State are given, based upon replies to circulars sent out to about 900 addresses, as well as on the personal observations of the authors. The diseases are grouped according to the host plants, and some notes are included on the relative distribution and damage. In some instances suggestions are given for control.

Three interesting species of Claviceps, F. L. STEVENS and J. G. HALL (*North Carolina Sta. Rpt. 1910, pp. 52–55, figs. 8*).—Previously noted from another source (E. S. R., 24, p. 448).

Investigations on the diseases of beets.—5, On the causes of the damping-off disease of beet seedlings, L. PETERS (*Arb. K. Biol. Anst. Land u. Forstw., 8 (1911), No. 2, pp. 211–259, figs. 12*).—The author discusses the life cycles of, and the various parts of the beet seedlings which are attacked by, the 3 main fungi responsible for the damping-off disease, viz. *Pythium debaryanum*, *Phoma betæ*, and *Aphanomyces lævis*.

It was found that *P. debaryanum* not only attacks and kills the hypocotyl and upper parts of the roots, but may also cause the death of the main root of young plants and of the side rootlets during the entire vegetative period. *P. betæ* as a damping-off fungus destroys the lower parts of the hypocotyls and the upper parts of the roots, but does not attack the main root tip or side roots. *A. lævis* attacks the plants very much like *P. debaryanum*, causing the death of the seedlings.

Investigations on the diseases of beets.—6, On the occurrence of the damping-off organisms in the soil, W. BUSSE, L. PETERS, and P. ULRICH (*Arb. K. Biol. Anst. Land u. Forstw., 8 (1911), No. 2, pp. 260–302*).—It is claimed that the damping-off disease of sugar beets can occur through organisms which are present in the soil or on the seed when planted. These soil organisms are able to kill the germinating seed and thus materially reduce the stand. The mechanical, physical, and chemical condition of the soil will also influence the stand without the intervention of any organism.

The greater part of the damping off results from the attacks of *Phoma betæ*, as this organism is generally present on the seed in large numbers. *Pythium debaryanum* attacks the beet plants immediately after germination and in the earlier developmental stages, while *Phoma betæ* and *Aphanomyces lævis* attack the plants somewhat later. Damp weather favors Pythium and Aphanomyces, while Phoma is more of a dry weather organism. The damping-off disease is especially bad on certain types of soil, viz, heavy encrusting soils, low soils rich in humus, moor soils, limy sands, and sandy soils.

Cabbage club root in Virginia, H. S. REED (*Virginia Sta. Bul. 191, pp. 12, figs. 5*).—An account is given of the occurrence of cabbage club root (*Plasmodiophora brassicæ*) in Virginia, together with observations on the spread of the disease by cultivators, the feet of horses, soil erosion, and through feeding of diseased cabbage to stock. Experiments are also reported on the control of the disease which were begun in 1909 and carried on for 2 years. The experiments consisted of soil treatments with lime, acid phosphate, and stable manure, comparisons being made of the yield of cabbage from the different plats. The usual custom of planting the seed in a hill and subsequently thinning to one plant was followed in order to prevent the introduction of diseases from the seed bed.

As a result of the experiments it appears that the use of lime is distinctly beneficial in combating club root disease in the field, but that acid phosphate is of little effect. Stable manure brings about conditions that are decidedly favorable for the spread of the disease.

The author recommends for the control of club root special effort to prevent the introduction of the disease into noninfected fields; the practice of crop rotations which will allow at least 3 years between crops of cabbage, rutabagas, or turnips; and limiting the application of stable manure or acid phosphate to the crop which precedes cabbage. Lime should be applied at the rate of 100 bu. or more per acre 1 or 2 years before planting the cabbage.

On the curly leaf disease of cotton, G. Kränzlin (*Pflanzer, 7 (1911), No. 6, pp. 327–329, pls. 4*).—The author reports the results of further investigations on this subject (E. S. R., 25, p. 652), in which experiments on the cause of the curly leaf of cotton indicate that the disease is caused by leaf hoppers (cicads).

A serious lettuce disease, F. L. Stevens (*North Carolina Sta. Bul. 217, pp. 21, figs. 8*).—Continuing work previously noted (E. S. R., 25, p. 548), the author describes a disease of lettuce due to *Sclerotinia libertiana*, which is known to occur over a considerable portion of the eastern part of the United States. In some regions it has been reported as being severely epidemic, losses of from 10 to 70 per cent being reported in various parts of North Carolina.

The disease is said to appear sometimes the first season the crop is grown in a given soil, but usually not until several crops have been raised. A study of the fungus showed that the spores are comparatively short-lived. The sclerotia are long-lived and are the only resting stage adapted to perpetuate the fungus.

Various methods of control have been tested. These include soil disinfection by heat or by chemical solutions, mulching, etc., but in the experiments conducted by the author in commercial beds none seemed very satisfactory. An experiment was then undertaken in which lettuce beds were thoroughly inoculated with sclerotia and seeded to lettuce. The beds were examined and as soon as a diseased plant appeared it was removed and the ground about it drenched with Bordeaux mixture or a solution of copper sulphate.

As a result of his investigations the author thinks that the disease may be controlled by a careful inspection of lettuce beds every other day and pulling up and burning all diseased plants. The place in the bed from which the plants are removed should be drenched with Bordeaux mixture or sulphate of copper solution, and the inspection continued throughout the season. The next year the same treatment should be followed, and it is thought probable that two years of this treatment will almost, if not entirely, eradicate the disease.

Heterosporium variabile, its relation to Spinacia oleracea and environmental factors, H. S. Reed and J. S. Cooley (*Virginia Sta. Rpts. 1909–10, pp. 78–99, figs. 10*).—This is a detailed account of investigations a preliminary note on which has been given elsewhere (E. S. R., 23, p. 350).

The authors, summarizing their investigations, state that the disease of spinach popularly known as rust is caused by the fungus *H. variabile*, and their investigations show that it is a weak parasite and usually infects spinach plants that have been injured or weakened by other agents. *Peronospora effusa*, a parasite of the spinach, appears to be a forerunner of the rust, and winter injury is another predisposing factor to the appearance of Heterosporium. Considerable variability in the form and habit of the fungus is noted, and in cultures it first grows poorly as a saprophyte and afterwards, changing its form and habit, grows luxuriantly.

The character of spore formation, growth of the mycelium, etc., are described at some length.

The diseases of sugar cane, C. Maublanc (*Agr. Prat. Pays Chauds, 10 (1910), Nos. 88, pp. 43–56, fig. 1; 89, pp. 143–148, fig. 1; 90, pp. 232–252, figs. 4; 91, pp. 312–320, fig. 1; 92, pp. 379–400, figs. 4; 93, pp. 502–506, fig. 1*).—This is a discussion of the common diseases of sugar cane, based on the notes of G. Delacroix, which includes both nonparasitic and parasitic forms and gives the symptoms, causes, and methods of combating each disease when known.

The following diseases and parasites are noted: Dichotomy of the stem, malformation of the internodes, abnormal arrangement of the buds, panachure, chlorosis, torsion of the leaves, "disease of Dongkellan," changes produced by injurious substances in the soil, alterations produced by poisons, gummosis, smut (*Ustilago sacchari*), rind disease (*Colletotrichum falcatum*), pineapple disease (*Thielaviopsis paradoxa*), *Coniothyrium sacchari*, *Lasiodiplodia theobromæ*, root rot (*Marasmius sacchari*), cane rot (*Schizophyllum commune* and *Trametes pusilla*), *Sphæronema adiposum*, *Cytospora sacchari*, *Saccharomyces apiculatus sacchari*, bacterial gummosis, point rot, collar rot, sereh (a disease characterized by shortened internodes which crowd the leaves together and cause the young blades at the top to open sooner than on normal plants and to spread out fan-like), leaf-splitting disease, root diseases (*Ithyphallus celebicus* and *I. coralloides*), Pythium, nematodes, *Santalum album*, *Alectra brasiliensis*, rust (*Uromyces kühnii*), leaf spot (*Cercospora köpkei*, *C. sacchari*, and *C. longipes*), red spot of the sheaths (*C. vaginæ*), black spot (*C. acerosum*), ring disease (*Leptosphæria sacchari*), *Venturia sacchari*, *Sphærella striatiformans*, *Phyllachora* sp., *Pestalozzia* sp., sclerotia of the leaves, sheath rots (*Sclerotium* spp.), and sooty mold.

The sereh disease of the sugar cane (*Agr. News [Barbados], 10 (1911), No. 241, pp. 238, 239*).—The symptoms and characteristics of this disease are given, together with a discussion of its probable cause. It is claimed that no known organism has as yet been shown to be the cause of this disease.

Tomatoes and Irish blight, D. McAlpine (*Jour. Dept. Agr. Victoria, 9 (1911), No. 6, pp. 379–382, fig. 1*).—Attention is called to the infection of tomatoes, especially of the fruits, by the late blight from adjacent diseased potato plants. The results are also given of cross inoculation experiments on both the tomato and potato with the spores of this fungus.

It was found that tomatoes and potatoes are mutually infected, and that even with the tough skin unbroken, spores falling on them when moist can cause infection, producing a fresh crop of spores within 9 days.

Some frost injuries of fruit trees, G. Lüstner (*Deut. Obstbau Ztg., 1911, No. 14, pp. 233–236, figs. 5*).—Descriptions are given of frost injuries to the leaves of apples, pears, and raspberries, due to late freezes in which the temperature fell from 2 to 6° below the freezing point during the month of April.

A new disease of apples, J. P. Stewart (*Pennsylvania Sta. Rpt. 1910, pp. 267, 268, pl. 1*).—A description is given of a new disease of apples, which is apparently due to physiological disturbances, its most conspicuous characters being shown in the twigs of the current season's growth. These twigs lose their normal color and become dull, blistered, and mottled, and at a casual glance the effect somewhat resembles that produced by the San José scale. Immediately under the epidermis of the diseased areas and extending about halfway to the cambium may be seen numerous small brown spots where the tissues are dead or dying. Later, on the surface, the epidermis cracks around and over the diseased spots, and they become rough, scablike, and slightly sunken through the drying out and death of the tissues beneath. In some cases the cracks go deeper and involve the wood. The leaves are affected sooner or later, probably through the girdling of the twigs. They turn brown, dry out, and crumble, beginning at the tips and outer margins.

The disease, it is said, usually becomes well developed and conspicuous by the middle or latter part of August. Specimens of diseased material were submitted to pathologists who failed to identify it with any known disease, and this is believed to be the first record of its occurrence on apple trees in this country. There seems to be some evidence which suggests a connection between the disease and heavy applications of certain fertilizers, and experiments are in progress to determine this point.

Hold-over blight in the pear, W. G. Sackett (*Colorado Sta. Bul. 177, pp. 2–8, figs. 2*).—On account of difference of opinion among fruit growers as to whether the micro-organisms which produce fire blight in the pear, apple, quince, and apricot can live over winter in diseased limbs, twigs, and fruit under Colorado conditions, an investigation was begun in 1909 and carried on through the winters of 1910 and 1911 to determine whether in addition to occurring in the cankers the organism remains viable over winter in infected twigs.

Material was collected from widely separated regions, representing a considerable portion of the orchard district of Colorado, and examined during the winter or early spring, cultures grown, and inoculations made into young pear seedlings. Out of a total of 83 twigs examined, 21 contained living *Bacillus amylovorus*, indicating that the organism is carried over in twigs and small limbs from one season to the other.

As having an important bearing on the control of this disease, the author quotes from an unpublished experiment of H. R. Fulton, botanist of the Pennsylvania Experiment Station, which seems to indicate that the bacteria of fire blight do not remain viable in twigs that have been cut and allowed to dry upon the ground. Out of 35 twigs containing the organism when cut, at the end of a week only 4 contained viable bacteria, and most of these had become inactive after 3 to 5 days.

It is believed from the comparatively rapid death of bacteria in cut twigs left upon the ground that there is no necessity for rigid destruction of cut-off twigs, as has been previously recommended. Further observations, however, will be made on this subject before definite conclusions are warranted.

Withertip, R. E. Smith (*Cal. Cult., 37 (1911), No. 4, pp. 76, 77*).—It is claimed by the author from his investigations and from tests made under his supervision that the withertip fungus is absolutely not a parasite on healthy citrus trees or fruit in California, but that it may occur on diseased or much weakened trees, on trees which have received any injury or sudden shock (such as might produce gum disease, dropping of the leaves, die back, or any other diseased condition), on branches or leaves injured by fire, fumigation, or frost, on the leaves, blossoms, or fruit when removed from the tree and partially dead, on fruit weakened by too low a temperature in cold storage, and, in short, on any citrus tissue which is dead or nearly so.

A contribution to the life history, parasitism, and biology of Botryosphæria ribis, J. G. Grossenbacher and B. M. Duggar (*New York State Sta. Tech. Bul. 18, pp. 113–190, pls. 12, fig. 1*).—The results are given of a study of the fungus *B. ribis*, which produces a destructive blight or wilt of currants.

This disease was first noticed by D. G. Fairchild (E. S. R., 8, p. 53) and was ascribed to a sterile fungus. Later on the disease was studied by Durand and reported as due to *Nectria cinnabarina* (E. S. R., 9, p. 359). As a result of later work, begun by the second author of the bulletin and continued and completed by Mr. Grossenbacher, it was definitely determined that the disease is due to *B. ribis*, and its life history and some of the more important points in its biology have been worked out.

The fungus infects and kills young currant shoots about the time they have completed their elongation growth, and it may cause older branches and parts of bushes to wilt throughout the summer, due to the advance of the fungus from the shoots infected during former seasons.

As noted above, the disease was first considered due to a sterile fungus, no spores having been observed on currant bushes or in pure cultures, and the authors find that there is no spore formation present when a branch wilts except occasionally at the point where the parasite enters. The investigations showed, however, that 3 types of spores are developed on the host, although the fungus usually remains sterile in pure cultures. Several fungi may appear saprophytically on the dead bushes, and one of the most prevalent, *N. cinnabarina*. has been considered the cause of the disease.

As the study of the life history of the fungus shows that the spores are produced on dead stems and branches of the host and that the currants are most commonly infected in midsummer, it is believed probable that the disease may be checked or reduced by carefully pruning blighted plants during May, instead of practicing winter pruning, as is at present customary. All prunings should be burned instead of allowing them to lie upon the ground during the summer.

A fungus disease of Ribes aureum, Röttger (*Deut. Obstbau Ztg., 1911, No. 14, pp. 236, 237*).—Attention is called to a disease of this currant, due, it is claimed, to *Camarosporium ribis*, which produces circular spots on the epidermis of young, nonwoody twigs.

On a disease of Ribes species due to Botrytis cinerea, F. Krause (*Deut. Obstbau Ztg., 1911, No. 14, pp. 237–239, figs. 3*).—The author holds that the cause of the disease of *R. aureum* noted above, as well as of other species and crosses of Ribes, is due to *B. cinerea*, as the sclerotia of this fungus was obtained from the diseased bark and also from the pith of the attacked stems.

The ascogenous form of the fungus causing dead-arm of the grape, C. L. Shear (*Phytopathology, 1 (1911), No. 4, pp. 116–119, figs. 5*).—The author reports the finding of an ascogenous form associated with the pycnidia of *Fusicoccum viticolum*, which is believed to be the perfect stage of this fungus.

Cultures from ascospores of this pyrenomycete, which is apparently a species of Cryptosporella, produced pycnospores and scolecospores practically identical with those produced from the pycnospores of *F. viticolum* taken from grapevines diseased with dead-arm. The fungus is tentatively called *Cryptsporella viticola* n. sp., and a description is appended.

Chlorosis and mildew, G. Provost-Dumarchais (*Jour. Agr. Prat., n. ser., 22 (1911), No. 28, pp. 43, 44*).—It is claimed that the unusual wet season of 1910 caused an abnormal amount of lime to be present in the soil water. On being absorbed by the grape roots this produced a diseased or weakened condition of the vines, thereby making them more susceptible to the attacks of the mildew.

[Double flower in dewberries and blackberries] (*North Carolina Sta. Rpt. 1910, pp. 10, 11*).—A brief account is given of investigations on the double flower of dewberries and blackberries, the cause of which is due apparently to the presence of a fungus in the flower bud. The relative resistance of different varieties is being studied, and some work is in progress on other methods of control.

A new raspberry disease, H. Rosenthal (*Deut. Obstbau Ztg., 1911, No. 14, pp. 239, 240, figs. 2*).—Attention is called to a disease of raspberries which attacks the young shoots in the early summer, producing brown spots on them and causing them to become long, slender, and almost leafless. The cause of this disease is not given, but it is supposed to be due to the attack of a fungus.

The hollyhock rust, its nature and developmental phases, J. Eriksson (*Compt. Rend. Acad. Sci.* [*Paris*], *152* (*1911*), *No. 25, pp. 1776–1779*).—The author gives the results of a 2-year biological study of this rust (*Puccinia malvacearum*). Two common hosts were found, viz, *Althæa rosea* and *Malva silvestris*, but many other species of the Malvaceæ are also attacked by the rust.

It is claimed that the dissemination of this rust from one locality to another is through diseased seeds or diseased rootstocks. At first, that is during the first 3 months, all the stalks remain unaffected, and they will continue so if the seeds from which they came were healthy, but if the seeds were from diseased plants the rust will suddenly appear vigorous and fully developed on the leaves. This first appearance is called the primary eruption, and differs from the latter and more irregular pustules which successively appear on all parts of the plant, called the secondary eruption of the rust. The primary outbreak originates from the interior of the host, while the secondary infection is produced from the sporidia of the primary sori.

The rust winters over in the rootstocks of *A. rosea* in the form of mycoplasm which enters into a kind of symbiosis with the living cells of the host, and in the early spring gives rise to the primary infection. In the autumn the sori produce 2 forms of spores similar morphologically, but germinating differently. The greater part of these spores on germination form short, thick promycelia which produce sporidia. The other type of spores on germination form long filaments or hyphæ, slender and straight, terminating in very short joints which fall off as conidia. The usual type of sporidia on germination forms a vesicular filament which penetrates into the palisade cells and in 10 to 20 days produces new sori.

The conidia on germination empty their contents as a plasmic mass on the epidermis of the leaf, and penetrating into the cells of the epidermis pass from there into the neighboring cellular tissues, where they take on a mycoplastic life. After this no evidence of rust infection is seen, but the infected leaves grow vigorously and seem perfectly healthy. In the embryo of the seed obtained from diseased plants there is no trace of mycelium, and yet it is from these seed that the diseased plants are developed.

On the wintering over of certain Erisiphaceæ, V. Peglion (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20* (*1911*), *I, No. 9, pp. 687–690*).—The author reports the wintering over of *Oïdium quercinum* in the conidial stage in the buds of the oak, *O. farinosum* in apple buds, and *O. leucoconium* in the winter buds of roses.

On the artificial production of the black canker of the chestnut, G. Briosi and R. Farneti (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20* (*1911*) *I, No. 9, pp. 628–633*).—The authors claim to have produced all the symptoms of black canker by inoculating the living bark of the chestnut with the spores of *Coryneum perniciosum*, and also with the ascospores of its perfect stage (*Melanconis perniciosa*).

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Revision of the spiny pocket mice (genera Heteromys and Liomys), E. A. Goldman (*U. S. Dept. Agr., Bur. Biol. Survey, North American Fauna No. 34, pp. 69, pls. 3, figs. 6*).—The spiny pocket mice, although of small size, are of considerable economic importance owing to the fact that they feed chiefly on seeds, including weed seeds, corn, wheat, and beans. They are widely distributed in the drier parts of North America. "While apparently not so injurious to crops as some other rodents, these mice, in some places, are among the most numerous of the small mammals, and their food habits, as well as those of the great family to which they belong, should be better known."

"Like many other small rodents, they are nocturnal and so shy that their presence in large numbers is readily overlooked. They inhabit widely differing faunal areas, but everywhere burrow in the ground under bushes, trees, rocks, logs, or other shelter, and generally are most numerous in such cover along the borders of fields. The entrances to the burrows are inconspicuous, opening, as they commonly do, under thick beds of leaves, logs, or rocks; small quantities of earth are thrown out about them from time to time, but not usually forming a definite mound. These pocket mice reach their greatest abundance in semiarid, partially wooded regions, both plains and mountain slopes being well populated with them. Some species of Heteromys, however, inhabit humid heavily forested areas apparently throughout middle America. From 3 to 5 young are produced at a birth, 4 being the usual number. While the young seem more numerous in spring and early summer than at other times, it is evident that the animals breed throughout the year."

Thirteen species and 1 subspecies of Heteromys and 10 species and 18 subspecies of Liomys are recognized by the author, of which 1 species (*temporalis*) of Heteromys and 1 species (*guerrerensis*) and a subspecies (*irroratus pretiosus*) of Liomys, all 3 from Mexico, are characterized for the first time.

Distribution of the American egrets, W. W. COOKE (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 84, pp. 5, maps 2*).—A brief discussion is given of the 2 common white herons or egrets (*Herodias egretta* and *Egretta candidissima*), together with maps which show their original range.

It is stated that the demand of the millinery trade for plumes has caused such a wholesale slaughter of these 2 species that they are almost extinct over large areas where they were formerly common. Fortunately in the case of both of these species breeding colonies still remain in the southern part of the United States to serve as centers of distribution to the districts formerly included in the range.

Eighth annual report of the state entomologist of Montana, R. A. COOLEY (*Montana Sta. Bul. 82, pp. 137–144*).—This report consists of a brief discussion of the work of the entomological department. It calls attention to the farmers' and fruit growers' need for more information, mentions the need of a movable exhibit, and discusses the relation of the state entomologist's office to other organizations in the State, the prices of insecticides in Montana, the necessity for a Montana law regarding adulterated insecticides, etc.

Department of entomology, S. B. DOTEN (*Nevada Sta. Bul. 73½, pp. 40–46*).—This report consists of brief accounts of an open-air insectary which has given very successful results, photographic records, and the more important insects of the year, namely, San José scale, oyster shell bark louse, European elm scale, codling moth, ants, cutworms, and Mediterranean flour moth. It is stated that the alfalfa leaf weevil had not been found in Nevada at the time of writing.

Report of the entomologist, R. I. SMITH (*North Carolina Sta. Rpt. 1910, pp. 31–33*).—This report consists largely of brief statements of the occurrence during the year of the lesser corn stalk borer (*Elasmopalpus lignosellus*), catalpa sphinx (*Ceratomia catalpa*), the sugar-cane borer or larger corn stalk borer, woolly apple aphis, striped flea beetle (*Phyllotreta vittata*), cross-striped cabbage worm (*Evergestis rimosalis*), Hessian fly, and strawberry weevil.

Report on economic entomology and zoology, F. V. THEOBALD (*Jour. Southeast Agr. Col. Wye, 1910, No. 19, pp. 83–211, pls. 56, figs. 8*).—This is the author's annual report on the occurrence of injurious insects, etc., in England. They are considered under the headings of animals injurious to man's domesticated animals, fruit trees and bushes, corn crops, root crops, pulse, hops, vegetables, and flowers, those causing annoyance to man, and those injurious to buildings, furniture, stores, and food. An account of the life history of the pear thrips, *Euthrips pyri*, in England as followed by the author is included.

Hosts of insect egg parasites in North and South America, II, A. A. Girault (*Psyche, 18 (1911), No. 4, pp. 146–153*).—This is in continuation of the paper previously noted (E. S. R., 19, p. 57).

[Mexican insect pests] (*Estac. Agr. Cent. [Mexico], 1909, Circ. 12, pp. 2, pl. 1; 1910, Circs. 22, pp. 9, pls. 6; 26, pp. 8, pls. 4; 33, pp. 11. pl. 1*).—These circulars are devoted to the fruit flies, ticks, ectoparasites of fowls, and the bean conchuela (*Epilachna corrupta*), and are by R. Ramirez, G. Gandara, A. Madariaga, and J. R. Inda, respectively.

Friendly insects, W. W. Froggatt (*Dept. Agr. N. S. Wales, Farmers' Bul. 34, 1910, pp. 18, pls. 4, figs. 15*).—This is a popular account of the parasitic and predaceous insects of Australia.

A contribution to the study of insects injurious to cotton in the Transcaspian District, B. Uvarov (*Russ. Ent. Obozr., 11 (1911), No. 1, pp. 28–37*).—This article treats briefly of the various insect pests of cotton in the Transcaspian District.

The cacao thrips (Heliothrips rubrocinctus), F. W. Urich (*Dept. Agr. Trinidad Bul., 10 (1911), No. 67, pp. 66–73; reprint, pp. 10, pls. 3*).—This summarized account of *H. rubrocinctus* includes a description of its several stages. The cashew tree is said to be one of the favorite food plants of this species, the author being led to think that it may be the original one. In some localities certain cashew trees lose their leaves regularly through its attack. The author has also observed thrips on guava, roses, almond (*Terminalia catappa*), and mango, as well as cacao.

Two new capsid bugs, resembling the tea mosquito bug, found attacking bamboos on gardens in Cachar, C. B. Antram (*Indian Tea Assoc., Sci. Dept. Quart. Jour., 1911, No. 2, pp. 1–3, pls. 2*).—A brief account of *Mystilus manni* and *M. antrami*.

Results obtained in the study of the froghopper during the wet season of 1910, L. H. Gough (*Dept. Agr. Trinidad Bul., 10 (1911), No. 67, pp. 5–50, pls. 7, fig. 1*).—The author here reports studies conducted, under the headings of (1) history of the froghopper blight in Trinidad, compiled from published records; (2) the symptoms and results of the blight; (3) life history of the froghopper, including its geographical distribution; and (4) methods of prevention of the damage caused.

On some Coccidæ affecting rubber trees in Ceylon, with descriptions of new species, E. E. Green (*Jour. Econ. Biol., 6 (1911), No. 2, pp. 27–37, pls. 2*).—Four species affecting rubber trees are described as new, namely, *Inglisia castilloæ, Mytilaspis fasciata, Tachardia albizziæ,* and *Dactylopius crotonis.*

Spraying for the melon aphis, M. H. Swenk (*Nebraska Sta. Rpt. 1910, pp. 35–57, figs. 5*).—Following a brief account of the life history, habits, and injury of this species, spraying experiments are reported. Lady beetles and their larvæ are thought to be the most valuable and effective of the natural enemies, especially *Hippodamia convergens*. The larva of *Allograpta obliqua* is the most abundant and useful of the 4 species of syrphus flies, and the larvæ of *Chrysopa oculata, C. nigricornis*, and probably other species are important enemies of the pest.

In experiments conducted with kerosene emulsion, it was found that in order to destroy the aphids it must be used at a strength that would burn the tender leaves. Experiments were then made with 5 other washes, namely, soap-and-tobacco wash, resin soda fish-oil wash, soap and fish-oil wash, resin soda wash, and tobacco decoction wash. The soap-and-tobacco wash, consisting of 2½ lbs. of soap dissolved in a gallon of water, mixed with 1 qt. of strong tobacco decoction and boiled 5 minutes, then diluted to make 5 gal. gave the best results, the aphids being practically all killed while the plants were not seriously injured by the spray. The resin soda fish-oil wash also killed the aphids, but the plants were somewhat more injured. The soap and fish-oil wash burned the foliage so badly that it was at once discarded, while the resin soda wash and the tobacco decoction used were ineffective. From further experiments conducted with soap-and-tobacco washes, the author concludes that ordinarily prepared tobacco decoction alone is not satisfactorily effective, but that when combined with soap suds it does the work well. A wash made up of 1½ lbs. of soap dissolved in ½ gal. of water with ½ gal. of strong tobacco decoction added and diluted to make 5 gal. will prove an effective wash in controlling the melon aphis and will not injure to any serious extent the foliage of either muskmelons or cucumbers.

The commercial tobacco extract "Blackleaf," which contains 2.7 per cent of nicotin, was tested at 3 strengths, namely 1:25, 1:50, and 1:70. "The results seem to indicate that the 1:50 dilution was sufficiently more effective than the 1:70 wash to justify the use of the greater strength. The 1:25 dilution, while not injurious to the plants, was unnecessarily strong and therefore not economical." After comparing the cost of the various soap-and-tobacco washes the author concludes that Blackleaf is the cheapest effective spraying material tried, while it also has the advantage of being practically ready for use, is of uniform and definite strength, and somewhat easier of application because of its greater thinness.

Attention is called to the importance of gathering together and burning the vines as soon as the crop is gathered and in this way destroying the aphids which are harboring thereon.

The large moth borer of sugar cane (Castnia licus), F. A. Stockdale (*Proc. Agr. Soc. Trinidad and Tobago, 10 (1910), No. 4, pp. 114–120*).—An account of the life history, habits, and remedial measures for this insect.

An insect pest of pigeon peas, F. A. Stockdale (*Jour. Bd. Agr. Brit. Guiana, 4 (1911), No. 4, p. 239*).—The larvæ of the skipper butterfly *Eudamus proteus* are said to be very destructive to young pigeon-pea plants (*Cajanus indicus*) in the Pomeroon District of British Guiana.

Combating cotton worms, G. Gandara (*Estac. Agr. Cent. [Mexico], Bol. 43, 1910, pp. 19, fig. 1*).—This bulletin deals with *Alabama* (*Aletia*) *argillacea*, its biology, and preventive and remedial measures.

A contribution to the knowledge of the pine spinner Lasiocampa (Gastropacha, Dendrolimus) pini, K. Eckstein (*Zool. Jahrb., Abt. System., Geogr. u. Biol. Tiere, 31 (1911), No. 1, pp. 59–164, pls. 6, figs. 3*).—This is a report of extensive studies of the life history, bionomics, enemies, and economic importance of this lepidopterous enemy of the pine. A bibliography of 103 titles is appended.

Cecidomyiid parasites of the mulberry Diaspis, J. J. Kieffer (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 4 (1910), pp. 128–133, figs. 3*).—Three cecidomyiids of the genus Arthrocnodax, bred from the branches of *Morus alba* infested by *Aulacaspis* (*Diaspis*) *pentagona*, are described as new.

Sarcophaga lineata a parasite of Stauronotus maroccanus in Sardinia, G. Paoli (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 4 (1910), pp. 347–352*).—An account is given of this sarcophagid parasite of the cricket *S. maroccanus*.

An account of Drosophila ampelophila, G. MARTELLI (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 4 (1910), pp. 163–174, figs. 6*).—Studies of the biology of the pomace fly, including its parasites, namely, *Pachyneuron vindemmiæ* and *Ganaspis musti*.

The potato beetles, J. R. INDA (*Estac. Agr. Cent. [Mexico], Bol. 24, 1909, pp. 14, pl. 1*).—An account of *Leptinotarsa decemlineata* and *L. multitaeniata*, with remedial measures.

The Colorado potato beetle, L. DE LA BARREDA (*Estac. Agr. Expt. Rio Verde, San Luis Potosi, Bol. 4, 1910, pp. 16, pls. 4*).—This is a popular account of the potato beetle as it occurs in Mexico, with directions for the application of remedial measures.

Report upon tobacco insect investigations, G. A. RUNNER (*Virginia Sta. Rpts. 1909–10, pp. 40–43*).—The author, an agent of the Bureau of Entomology of this Department, reports briefly upon investigations of the tobacco stalk borer (*Crambus caliginosellus*), conducted largely at Appomattox, Va.

This borer, which is said to be the most important tobacco insect in Virginia, is found in most, if not all, the tobacco-growing sections of the State. The damage to the tobacco crop alone is estimated to average at least $800,000 annually and it is thought probable that the damage to the corn crop amounts to even more than that to tobacco.

"The tobacco is attacked soon after planting, and feeding continues until about the first or second week in July. The worms commence feeding just below the surface of the ground. Injured plants may usually be detected by their stunted or wilted appearance. This is more noticeable during hot, dry weather. The stems are in some cases entirely cut off, although this is rather unusual. The worms as a rule commence to feed on the outer portions of the stalk, a short distance below the surface of the ground. As feeding continues, the larvæ, especially the smaller ones, enter the stalks and tunnel upward, the burrows frequently extending to the base of the first leaves and to some distance above the surface of the ground. When not feeding the worms are usually found in cylindrical web-lined galleries which extend from the plant, often several inches beneath the surface of the soil. The insects pupate in the soil, near the plants on which they feed. The adult moths emerge during late July and in August. The eggs are deposited, apparently at random, over weedy fields, soon after the moths emerge. Most of the eggs have hatched by the first of September.

"Where the worms are numerous it is almost impossible to secure a perfect stand of tobacco until late in the season, as the larvæ remain in the ground and attack the plants set in place of those first injured or killed. Frequent replanting is necessary, the first planting sometimes being almost entirely destroyed. Many of the plants attacked partially recover from the injury, but remain dwarfed or stunted. . . . Early planted tobacco is usually better in quality and brings a better price than late-planted tobacco, but where the worms are numerous, early planting seems out of the question.

"Injury is greatest where tobacco is planted on weedy land, owing to the fact that the roots of certain weeds are the main food of the worms. From the data obtained during the past season, it is evident that clean cultivation of the land for some time previous to planting tobacco will be found effective in keeping the worms in check. Crops which are immune from attack by the worms (preferably leguminous crops) should be grown the year before the land comes in tobacco, and the ground kept free from weeds.

"As with tobacco, the injury is greatest when corn is planted on land which has been weedy pasture or meadow previously; or when planted on land which has not been under cultivation for a number of years and on which there is a rank growth of weeds. On such land it is often very difficult to secure a satisfactory stand of corn. In Appomattox County, certain fields under observation were replanted several times, and owing to the lateness of the season when a stand was secured, the value of the crop was decreased fully 50 per cent.

"The worms attack the young corn just below the surface of the ground and burrow into the base of the stalks. The outer portion of the stalk is frequently girdled. If the stalks are small when attacked, they are either killed or so stunted or dwarfed that they never fully outgrow the injury, and produce little or no grain. Much of the corn is destroyed just as the seed is sprouting. When the stalks reach a height of 1 ft. or more, comparatively little damage is done. Several larvæ are often found about the roots of a single stalk. As many as 22 have been collected from one hill of corn. Injury is not apt to be as severe in wet weather, as the plants are more vigorous and better able to withstand the attacks of the worms. In wet weather, weeds which furnish suitable food for the worms are apt to be plentiful, and these are attacked in preference to the corn."

A careful study of the life history and seasonal history of this species is under way, and attention is being given to field experiments with various methods of control. As a number of common weeds have been found to be natural food plants of the worms, a rotation of crops intended to keep the weeds in check will assist in reducing the number of worms in the field.

The palm weevil as a sugar cane pest, L. H. GOUGH (*Dept. Agr. Trinidad Bul., 10 (1911), No. 67, pp. 59–64, pl. 1*).—The author reports having observed during a visit to San Fernando a field of sugar cane in which 25 per cent of the plants had been killed, and many more injured or checked in their growth, by the palm weevil (*Rhynchophorus palmarum*).

Isle of Wight bee disease (*Bd. Agr. and Fisheries [London], Leaflet 253, 1911, pp. 2*).—A brief account is here given of the epidemic disease that first attacked bees in the Isle of Wight and has since reached the mainland, where it appears to be spreading. A description of the symptoms and a plan of procedure to be followed upon its appearance among bees are included in the account.

Annual report of the Bee Keepers' Association of the Province of Ontario, 1910 (*Ann. Rpt. Bee Keepers' Assoc. Ontario, 1910, pp. 64*).—The proceedings of the association are here reported.

Two new insect pests in Nebraska (*Forestry Quart., 8 (1910), No. 4, pp. 411–414*).—In the first paper, which is entitled A New Insect Enemy of the Western Yellow Pine (pp. 411–413), L. Bruner reports that a sawfly resembling *Lophyrus townsendi* has been found to defoliate western pine in the northwestern part of the State, brief notes on its biology being included in the account.

In the second paper, entitled The Pine-Tip Moth (*Retinia frustrana*), M. H. Swenk reports that for the past 2 seasons young pines growing upon the National Forest at Halsey, Nebr., have suffered quite severe injury through the ravages of this insect. A careful examination made in July, 1909, showed that 35 per cent of the new tips were affected, practically all of which were dead and brown. "The trees most injured were in the older parts of the plantations where the jack pine was about 6 ft. tall with smaller Scotch pine scattered among them. During the past season, 1910, these injuries have spread to practically all the young pines on the forest and the attack was noticeably more serious, the injured twigs exceeding 50 per cent of the entire number and on some trees including nearly every new shoot."

"The insect is at least 2-brooded in this locality; the injury by the first brood of larvæ becoming manifest by the middle of June, at which time the larvæ are approaching full size and the older ones are already going into the pupa condition. The pupal stage is of short duration and the moths commenced to emerge by June 28 and continued coming out for nearly a month. The majority of the moths had emerged by July 10. In late July and early August the tiny larvæ of the second brood may be found working in the terminal buds, and, as this brood develops, the previous injury is duplicated. The egg of the moth is a small, flat, yellowish object and seems to be usually deposited near the extreme end of the young tips so that the larvæ on hatching burrow immediately into the tender bud, and, as it develops, they form a cavity from 1 to 3 in. in length. When full grown, the insect pupates near the terminal end of the infested tip. This burrowing causes the death of the tip, and, as the needles rapidly turn brown and drop off, the injury becomes very conspicuous. On the National Forest the principal injury occurs on jack pine but the Scotch pine and western yellow pine are also affected. A considerable amount of parasitism is present among the tip moths, a small, black ichneumon fly and a chalcis fly being the principal parasites." An entomophilous fungus was also at work during 1910.

A new sawfly enemy of the bull pine in Nebraska, M. H. SWENK (*Nebraska Sta. Rpt. 1910, pp. 8–33, figs. 18*).—In May, 1910, reports were received to the effect that the pines east of Crawford were being stripped of their needles by worms. It was found that the region of greatest infestation lay in an elevated portion of Pine Ridge, east of the town of Belmont.

Specimens received and bred to adults were found to represent a new species of sawfly, closely related to *Diprion* (*Lophyrus*) *townsendi*. Rearing cage experiments showed that the larvæ, while preferring the foliage of the bull pine or rock pine (*Pinus scopulorum*), also fed eagerly upon needles of the closely related Austrian pine (*P. austriaca*) and to a limited extent upon the Scotch pine (*P. sylvestris*).

The larvæ of this sawfly are conspicuously gregarious and occur in bunches of from 25 to 50 or 75 among the needles at the tips of the branches. The larvæ which hibernate in the trees become active in the spring and are nearly full grown by May 1, at which time the tops of the trees have been conspicuously denuded. By this time they stop feeding to any great extent in the day time and soon thereafter begin dropping to the ground to spin up. At the time of the author's first visit on May 29, the larvæ were very abundant on the trees but were said to be much less so than they had been a week or 10 days previously. By June 10 they had almost disappeared from the trees. In rearing cages the first larva spun up May 25 and the next on May 30; this continued until June 27 when the last of 69 larvæ spun its cocoon.

Pupation apparently begins in early June and extends over at least a month. The first adults were found in the field on June 10 and by July 7 and 8 the adult females were common on pine tips. A small clump of young larvæ of the new generation was found in the field as early as July 8, these probably representing exceedingly accelerated individuals, the progeny of adults which issued in early June. By October 27 the larvæ had become half grown and had made very obvious defoliations. About this time they apparently cease active feeding and do not grow perceptibly until the following spring. Hibernation takes place in 2 distinct ways, namely, as half grown larvæ in the trees and as fully developed larvæ tightly packed in cocoons in the ground. The larvæ which hibernate in cocoons in the ground, at least in part, are thought by the author to be those which have spun up after having become full grown the preceding season.

The tryphonine ichneumonid *Exenterus lophyri* is said to be a powerful enemy of this sawfly. Out of 60 cocoons containing larvæ July 13, 30 were found to be parasitized, this representing 35 per cent of 85 cocoons examined. Two other ichneumonids, namely, *Phygadeuon* (*Mastrus*) *neodiprioni* and *P.* (*Bathymetis*) *patulus*, were reared but were not seen in the field and are thought to be of inconsequential importance. Several species of tachinids were found in the infested locality, the most common of which was *Euphorocera claripennis*. This species emerged July 1 and 8 from 2 larvæ which spun up June 11. An undetermined bombyliid emerged July 25 from a cocoon collected July 8.

Other natural enemies mentioned are chipmunks (*Eutamias pallidus*), the mountain pine grosbeak (*Pinicola enucleator montana*), and western tanager (*Piranga ludoviciana*). A bacterial disease caused the death of many of the larvæ.

No practical means of artificial control has been suggested. It is pointed out that burning over the grass and fallen needles in the fall would control but partially as this species spins its cocoons chiefly in the ground where it would be out of reach of the fire. Observations indicate, however, that the outbreak is being brought under control by the natural enemies. The author considers it probable that the affected area will not be further extended and that the injury will distinctly abate in intensity during the next season or two.

Some new species of reared ichneumon flies, H. L. Viereck (*Proc. U. S. Nat. Mus., 39 (1911), pp. 401–408*).—Eleven genera and as many species are described as new to science, namely: *Meteorus loxostegei*, bred from *Loxostege sticticalis*, at Rocky Ford, Colo.; *Schizoprymnus phillipsi*, bred from timothy, at Richmond, Ind.; *Chelonus shoshoneanorum*, probably parasitic on *Argyresthia* sp., at Colorado Springs, Colo.; *Apanteles betheli*, parasitic on *Argyresthia* sp., at Colorado Springs, Colo.; *Microgaster comptanæ*, bred from *Ancylis comptana*, at Rocky Ford, Colo.; *Heterospilus mordellistenæ*, parasitic on *Mordellistena ustulata*, at Wilmington, Ohio; *Limnerium* (*Horogenes*) *discoocellellæ*, bred from *Gelechia discoocellellæ; Exenterus lophyri*, reared from *Lophyrus townsendi*, at Crawford, Nebr.; *Phygadeuon* (*Ænoplex*) *argeæ*, reared from the cocoon of a species of (Hylotoma) Arge, at Marietta, Ohio; *Phygadeuon* (*Polytribax*) *pallescens*, reared from the chrysalis of Hyphantria, and of *Eudamus* (*Epargyreus*) *tityrus* at Castle Rock, Pa.; and *Mesochorus perniciosus*, bred from *Loxostege sticticalis*, at Rocky Ford, Colo., and probably a hyperparasite of *Apanteles læviceps*.

Notes on some parasites of Agrotis segetum, N. Kurdjumov (*Russ. Ent. Obozr., 11 (1911), No. 1, pp. 48–53*).—The parasites noted are *Oophthora semblidis*, *Gonia capitata*, and *Cnephalia* sp.

On the parasitic Hymenoptera collected by Mr. A. J. T. Janse, Transvaal, P. Cameron (*Ann. Transvaal Mus., 2 (1911), No. 4, pp. 173–217*).—This paper presents descriptions of a large number of new genera and species of parasitic Hymenoptera, together with records of the hosts of a number.

Contributions to the knowledge of the Chalcididæ of Italy, L. Masi (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 4 (1910), pp. 3–37, figs. 29; 5 (1911), pp. 140–171, figs. 11*).—In continuation of 2 papers previously noted (E. S. R., 22, p. 760), the third paper of the series includes descriptions of 6 new species, and the fourth of a new genus (Merisoides) and 6 new species of chalcidid parasites.

Contributions to the knowledge of the parasites of the olive fly, F. Silvestri (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 4 (1910), pp. 295–306, figs. 6*).—Accounts are presented by G. Martelli on the biology of

Tischeria complanella and of *Myopites limbardæ*. See also a previous note (E. S. R., 22, p. 59).

The zoocecidia of plants in Germany and their occupants, edited by E. H. Rübsaamen (*Zoologica, 24 (1911), No. 61, pt. 1, pp. 293, pls. 6, figs. 3*).—The first paper of this work (pp. 1–104), by F. Thomas, consists of an index of the literature up to the close of 1906 on the animal galls of Germany and their occupants. The second paper (pp. 105–165) consists of a general account by E. Küster of animal galls and their occupants. The third paper (pp. 167–293), by A. Nalepa, is devoted to the eriophyid gall mites, their structure, development, ecology, and classification.

The animal kingdom.—Ixodidæ, L. G. Neumann (*Das Tierreich.—Ixodidæ. Berlin, 1911, No. 26, pp. XVI+169, figs. 76*).—In this systematic treatment of the ticks, the author divides the family Ixodidæ into 2 subfamilies, namely, the Ixodinæ, including the sections Ixodini and Argatini, and the Spelæorhynchinæ, represented by the single species *Spelæorhynchus præcursor* described by Neumann in 1902 from a specimen collected from a bat (*Carollia brevicauda*) in Pernambuco.

The section Ixodini is divided into 3 tribes, namely, Ixodaria, including the genus Ixodes with the 3 subgenera Ixodes, Ceratixodes, and Eschatocephalus; Rhipicephalaria, including the genera Rhipicephalus, Margaropus, and Hyalomma; and Amblyommataria, including the genera Amblyomma, Aponomma, Dermacentor, and Hæmaphysalis. The section Argatini is represented by the genera Argas and Ornithodoros.

A synonymical bibliography and description, together with host and distribution lists, is given for each species. Tables for the separation of species, a systematically arranged host list, and an index are also included.

The preparation of this work was completed on February 29, 1908.

Ticks: A monograph of the Ixodoidea, II.—Ixodidæ, G. H. F. Nuttall and C. Warburton (*Cambridge, 1911, pp. XIX+105–348, pls. 4, figs. 193*).—This second part of the authors' monograph (E. S. R., 21, p. 562) is divided into two sections, the first dealing with the classification of ticks, and the second with the genus Ixodes.

Under the genus Ixodes the authors give the synonymy and literature, and keys for the determination of the species based upon males, females, nymphs, and larvæ so far as the material at hand has permitted. Technical descriptions of 51 species which the authors consider valid and of varieties and subspecies follow. The synonymy, iconography, bibliography, descriptions of the stages, and geographical distribution are given for each species. These detailed accounts of the species are followed by a list showing the geographical distribution of the genus, a list of condemned and doubtful species of Ixodes, including their synonymy and literature, notes on doubtful species of Ixodes, and notes on the biology of Ixodes by G. H. F. Nuttall (pp. 294–317). Two appendixes include reprints of papers (1) on The Process of Copulation in *Ornithodorus moubata* (pp. 318–323), by G. H. F. Nuttall and G. Merriman,[a] and (2) On the Adaptation of Ticks to the Habits of Their Hosts (pp. 324–345), by G. H. F. Nuttall.[b] An index to the valid species of Ixodes, together with a list of the collections in which the types are to be found, is included.

Ticks: A monograph of the Ixodoidea.—Bibliography of the Ixodoidea, G. H. F. Nuttall, L. E. Robinson, and W. F. Cooper (*Cambridge, 1911, pp. VI+68*).—This bibliography, which contains 2,004 titles, deals with ticks and their relation to disease. It is arranged by authors, and includes the date of publication.

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[a] Parasitology, 4 (1911), No. 1, pp. 39–44.

[b] Pp. 46–67.

Spirochætes, a review of recent work with some original observations, W. C. Bosanquet (*Philadelphia and London, 1911, pp. 152, pl. 1, figs. 90*).—Section 1 of this work (pp. 11–71) deals with the general characters of spirochetes. Section 2 (pp. 72–116) consists of systematic descriptions of the species. A bibliography of 20 pages arranged by subjects, species, etc., and bibliographic and subject indexes are included in the work.

A preliminary note on the extrusion of granules by trypanosomes, W. B. Fry (*Proc. Roy. Soc. London, Ser. B, 84 (1911), No. B 568, pp. 79, 80, fig. 1*).—The author has found that at times during the course of an infection certain of the trypanosomes extrude from their bodies granules which are thrown off, apparently with considerable force, and then appear to possess a certain motility of their own in the blood.

Spraying trees with zinc arsenite, E. E. Luther (*Better Fruit, 5 (1911), No. 8, pp. 65, 66*).—It is stated that investigations in the Pajaro Valley, Cal., have shown that zinc arsenite can be used on apples with safety, it having been sprayed as thick as heavy whitewash without the slightest injury. "On small field crops, such as beans, potatoes, etc., it has given no injury, but on the peach, which is supposed to be more hardy than the bean, the injury was severe." It is readily suspended, requiring little or no agitation, has a great covering power, is highly toxic for insects, and much cheaper than arsenate of lead. The author states that "the equivalent of 12 cts. of arsenate of lead can be purchased in this material for less than 5 cts."

Zince arsenate, A. Desflassieux (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 32 (1911), No. 12, pp. 358, 359*).—The author has found the results obtained from the use of zinc arsenate as an insecticide to be similar to those from lead arsenate. Among the advantages that it has over lead arsenate, mention is made of its lightness, the fact that even if used in excess it does not precipitate when added to copper mixtures, and the absence of the dangerous action of lead salts on man, zinc having an emetic rather than toxic action.

The formula recommended consists of arsenate of soda 200 gm. and zinc sulphate 475 gm., the latter to be dissolved in 10 liters of water and added to the arsenate of soda dissolved in a few liters of water. This stock solution should be diluted to make 100 liters or added to a copper mixture, if desired, and diluted to 100 liters.

An index to Circulars 1 to 100 of the Bureau of Entomology, R. P. Currie and A. N. Caudell (*U. S. Dept. Agr., Bur. Ent. Circ. 100, pp. 49*).—The index of these circulars is preceded by a list of Circulars 1 to 100, with their revisions. It is stated that this list may be considered final since the policy of issuing revised editions of circulars, that is, under the original serial number, has been discontinued. For circulars which have gone through one or more revisions the latest edition is the one indexed.

FOODS—HUMAN NUTRITION.

Wheat and flour investigations (*Washington Sta. Bul. 100, pp. 52, figs. 2*).—This bulletin consists of three parts.

I. *Analyses and tests of crops of 1908 and 1909*, R. W. Thatcher, G. A Olson and W. L. Hadlock (pp. 3–24).—In continuation of earlier work (E. S. R., 23, p. 467), analyses are reported of a large number of samples of Washington wheats. Striking differences were not noted in the samples of the crop of 1908 as compared with wheats previously analyzed, though, in general, the moisture content was lower. In samples of the crop of 1909 this was also noticeable, and variations in the relative protein content were significant. Of the varieties most commonly grown Bluestem again headed the list with the highest protein content, Red Allen being next in protein content, gluten test, and high yield of flour, while Turkey Red showed considerably lower average protein content compared with other varieties than in previous years, although the average wet gluten tests of the flour did not show so marked a falling off. The continually lower rank held by Turkey Red wheat in protein content over the 5 years the investigations have been carried on indicates that this variety grown longer under local conditions "tends to lose its relatively high protein content as compared with other fall-sown varieties."

II. *The composition and milling quality of Washington wheats*, R. W. Thatcher (pp. 25–44).—The subject is discussed on the basis of the analyses of 431 samples of wheat reported in this and earlier bulletins, of which 349 samples represent the 7 varieties most commonly grown in eastern Washington, namely, Bluestem, Little Club, Turkey Red, Jones Winter Fife, Fortyfold, Red Allen, and Red Russian. Thirteen represent macaroni or durum wheat, and 8 each Sonora and White Amber, the remainder being varieties grown in small quantities or in limited areas.

Considerable variations were noted in the water content and the nutrients present in the different varieties and in different samples of the same variety. This subject, and particularly the effect of rainfall and climatic conditions on protein content, is discussed with reference to the wheats grown in different parts of the State and with reference to the broader question of the effect of climatic conditions on the composition of wheat. In general, the author believes that there are certain definite variety differences in composition which can be "correlated with the habits of each variety as to rapidity of ripening, and that these variations are due to the relative length of ripening period, as a variety characteristic, and, therefore, come under the same general rule as do all other observed variations in type or composition. Final conclusions on this matter must be suspended until sufficient data as to the ripening habits of the different varieties have been secured."

III. *A simple apparatus for determining the milling qualities of wheats*, G. A. Olson (pp. 45–52).—An inexpensive outfit for milling wheat is described and tests reported in comparison with a commercial experimental mill which showed that it gave accurate results, the largest variation recorded being 2.6 per cent less bran and shorts with Bluestem wheat than was obtained with the commercial experimental mill. On an average 119 samples representing different varieties of Washington wheats gave 27.37 per cent bran and shorts and 72.77 per cent flour. Owing to the absorption of water some of the samples gained weight during milling, the average amount being 1.01 per cent, and either owing to drying or unavoidable losses other samples lost in weight, the average being 1.21 per cent. The wide variations observed in the yield of bran, shorts, and flour "show the importance of milling samples of wheat in order to determine the relative value of different wheats which are sold."

Milling tests of wheat and baking tests of flour, J. T. WILLARD and C. O. SWANSON (*Kansas Sta. Bul. 177, pp. 29–153, figs. 25*).—Information is summarized regarding methods of cleaning wheat followed in some Kansas mills, and the results are reported of experimental studies on the milling of wheat, chiefly of the crops of 1906 and 1907, and of baking tests with the resulting flours. In addition, germinated wheat was compared with sound wheat, and the milling and baking qualities of wheat as affected by moisture and heat were studied. The general purpose of the investigation has been to trace, if possible, connections between the chemical compositions of wheats and flours and their milling and baking qualities. The investigations include detailed analyses of about 60 wheats, with milling and baking tests, the latter including in many cases comparisons of patent, break, and tailings flour from the same grinding. A considerable amount of milling and baking apparatus specially designed for experimental work is described, including a new design for test baking-pans.

According to the authors, the investigations show that "the baking results are influenced very greatly by a large number of details, and that while the gliadin-protein ratio may be of some importance its effect may be entirely offset by the influence of other agencies. The special baking experiments recorded show how easily results may be modified by variations in the amount of water or yeast used, differences in the extent of the rising, in the working of the dough, in the fineness of the flour, in the initial temperature of baking, etc.

"The effect of germination of wheat on the baking qualities of the flour which it may yield was shown to be pronounced, but not of the character that might have been anticipated. Slight germination injured the bread but very little. The effect of heat upon the bread making power of wheat was very marked. Moist wheat dried at 100° C. to 120° C. was ruined for this purpose."

Bread as made in Milan, E. Galli (*Rend. Soc. Chim. Ital., 2. ser., 2* (*1910*), *pp. 179–184*).—Recommendations are made for improvements in bread making in Milan, which are based on the results of an experimental study.

The bread question, J. S. Wallace (*Brit. Med. Jour., 1911, No. 2643, pp. 437, 438*).—In connection with a discussion of the relative nutritive value of bread of different sorts, particularly with reference to food as a factor in dental caries, experiments are reported on the efficiency, for the removal of bacteria on teeth, of different sorts of food when masticated.

The author believes it is fairly safe to conclude that "No farinaceous foodstuff in general use in this country is less harmful to the teeth than bread when eaten with butter, and no farinaceous foodstuff is more beneficial from the point of view of oral hygiene; especially is this the case when the bread is eaten with butter and a goodly proportion of crust.

"The different varieties of bread (that is, white, standard, and stone-milled) make no appreciable difference in inducing dental caries, beyond the difference which the physical differences of the bread make in their detergent effects on the teeth. . . .

"The crust is always preferable to the crumb in all varieties of bread. Similarly, toasted bread of any variety is preferable to untoasted bread of any variety.

"The amount of phosphates or proteid absorbed from one kind of bread may be greater than from another kind. It is said that more phosphates are absorbed from white than from coarse whole-meal bread. From the point of view of dental caries, this does not seem to be of any consequence whatever."

The composition of diabetic foods, F. W. F. Arnaud (*Brit. Food Jour., 13* (*1911*), *No. 152, pp. 143, 144*).—In a paper read before the British Pharmaceutical Conference, July, 1911, the author reports and discusses the results of analyses of a number of commercial diabetic foods. In a majority of the samples examined the starch content was high, and "it would appear to be expedient that some steps should be taken for the repression of the business carried on in the sale of ordinary bread and flour as specially prepared diabetic foodstuffs, or the composition of these foodstuffs should be declared to the purchaser."

The effect of low temperatures on ground chicken meat, H. W. Houghton (*Jour. Indus. and Engin. Chem., 3* (*1911*), *No. 7, pp. 497–505*).—Chicken meat subjected to cold storage even for a period of 5 months, the author concludes from his extended analytical studies, exhibits certain physical and chemical changes which show clearly that it is not identical with fresh material. The cold storage meat was soft, in marked contrast to fresh chicken meat, and had a slightly characteristic odor.

"The chemical changes that apparently take place in the cold-stored meat by direct comparison with the original chicken meat are (1) slight variations of moisture and ether extract; (2) a small increase of ammonia, especially in the case of the light chicken meat; (3) a decided increase of water-soluble nitrogen, total solids, and organic extractives in the light chicken meat, with a slight decrease of the same constituents in the dark meat; (4) a decrease of coagulable nitrogen in both varieties of chicken meat during the first 30 days, followed by a rise which did not reach that of the fresh sample; (5) an increase of amino acids in both kinds of chicken meat, with an increase and decrease of the proteoses and peptones respectively in the light and dark chicken meat.

"An increase of soluble phosphorus was indicated during the first 90 days of the storage period, which was more marked in the dark meat than in the light meat. In the cold-stored samples a little volatile sulphur was found, none being detected in the fresh meat. The analyses of chicken fat indicated a fairly constant composition, but in the chicken meat fat of the cold-stored chicken the iodin number increased regularly while the index of refraction decreased slightly.

"The alteration particularly noticed in the light meat was inhibited to a certain extent by storing in an atmosphere of carbon dioxid, accompanied by an increased production of proteoses, peptones, and amino acids. The initial increased production of these nitrogen bodies is probably due to enzymic action during the first 30 days at 12° C.

"The enzyms detected were peroxidase, catalase, protase similar to trypsin, invertase, and a nitrate-reducing enzym."

The inspection of fish at the Paris central market, BLANCHARD (*Hyg. Viande et Lait, 5 (1911), Nos. 3, pp. 149–157, figs. 10; 5, pp. 283–289, figs. 11; 7, pp. 404–411, figs. 11; 8, pp. 466–474, figs. 12*).—Illustrated descriptions are given of the fish found in the Paris market.

The composition of the apple as affected by irrigation, C. E. BRADLEY (*Jour. Indus. and Engin. Chem., 3 (1911), No. 7, pp. 496, 497*).—In general, the results showed that apples from irrigated plats had a somewhat higher moisture content and consequently lower total solids, but higher percentages of sugar, than apples from unirrigated plats.

"The protein content of the peelings tested averaged 0.70 per cent while that of the edible portion was 0.20 per cent. Only traces of starch were present in the samples tested.

The abuse of sweetmeats, A. HOPEWELL-SMITH (*Brit. Med. Jour., 1911, No. 2643, pp. 438–442, dgms. 2*).—An experimental study is reported of the effects of confectionery, including chocolate, upon caries-forming bacteria. The conclusions reached were not favorable to the use of sweetmeats, particularly by children.

The paper is followed by a discussion.

Food accessories, stimulants, and narcotics, C. HARTWICH (*Die Menschlichen Genussmittel. Leipsic, 1911, pp. XIV+878, pls. 24, figs. 168*).—The author has included in this volume a large amount of data regarding the origin, history, use, and effects of such articles as tea, coffee, cocoa, chocolate, and maté, as well as information of the same sort regarding stimulants and narcotics used in different parts of the world.

The food laws of the United Kingdom and their administration, F. L. DUNLAP (*U. S. Dept. Agr., Bur. Chem. Bul. 143, pp. 42*).—In this digest of data the English pure food laws are listed, terms defined, administration work and methods of enforcement considered, and the principal food laws discussed in some detail.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 1035, pp. 3; 1036–1040, p. 1 each; 1041–1042, pp. 2 each; 1043, pp. 7; 1044, pp. 8; 1045, pp. 5; 1046–1048, p. 1 each; 1049, pp. 10*).—These notices of judgment have to do with the adulteration of mushrooms, "creme wafels," preserved whole eggs, tomato catsup, frozen eggs, and black olives; the misbranding of sugar corn flakes and two drug products—"radio-sulpho" and "radio-sulpho brew"; the adulteration and misbranding of cider vinegar, preserved peach, apple, and sugar, special wild cherry soda water flavor, pistachio extract, and grape juice; and the alleged misbranding of oxidin.

Report of the division of food and drugs, R. B. FITZ-RANDOLPH (*Ann. Rpt. Bd. Health N. J., 34 (1910), pp. 199–231*).—Inspection and other work of this division is summarized.

Food and feeding in health and disease—a manual of practical dietetics, C. WATSON (*Edinburgh and London, 1910, pp. XVI+638, pls. 17, dgms. 8*).—This volume contains chapters on food and its functions, different groups of foodstuffs, patent, proprietary, and predigested foods, diet for persons of different ages, and other general topics, as well as on diet in diseases of different sorts, diet cures, and similar subjects.

In an appendix the author has reprinted the results of investigations carried on by himself and his associates regarding the effects of diet on the structure of animal tissues.

The volume is provided with a comprehensive index.

Food and feeding, R. SAUNDBY (*Brit. Med. Jour., 1911, No. 2630, pp. 1218–1221*).—A summary of data, and discussion of dietary systems of different sorts.

The feeding of necessitous children (*Lancet [London], 1911, II, No. 4, pp. 239, 240*).—A brief summary, based on a report by D. Forbes and J. Lambert, of the results obtained in feeding needy school children. According to the data summarized, often the first gain which an ill-nourished child makes on being properly fed is in height.

The cost of living, salaries, and wages in Trieste in the last quarter of a century, M. ALBERTI (*Il costo della vita, i salari e le paghe a Trieste nell' ultimo quarto di secolo. Trieste, 1911; rev. in Economist, 73 (1911), No. 3545, pp. 297, 298*).—Information is given regarding the kinds of food used, as well as statistical and other data such as would be indicated by the title.

Housekeeping efficiency, C. and MARY BARNARD (*Housekeeping Expt. Sta. [Conn.] Buls. 11, pp. 20, pls. 3; 12, pp. 20, figs. 5*).—Increased efficiency through correct house planning, the use of conveniences and labor-saving devices, and the elimination of needless work are discussed, and data recorded regarding the actual labor involved in performing a definite task by different methods.

Soyer's paper-bag cookery, N. SOYER (*New York, 1911, Amer. Ed., pp. 130*) —A method of cooking meats and other foods enclosed in specially prepared paper bags is described, which it is claimed is economical of time, labor, and fuel, and which retains flavors. Many recipes for the preparation of individual dishes are given.

Paper-bag cookery, J. L. GRIFFITHS (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 163, pp. 206, 207*).—A summary of data on the system of cookery referred to above.

Paper-bag cookery, R. WESTACOTT (*Daily Cons. and Trade Rpts. [U. S.], 14 (1911), No. 206, p. 1009*).—A note regarding the bags used in this method of cookery.

Feeding experiments with isolated food substances, T. B. OSBORNE, L. B. MENDEL, and EDNA L. FERRY (*Carnegie Inst. Washington Pub. 156, 1911, pp. 53, fig. 1, dgms. 21*).—In this paper, which may be regarded as a progress report, problems of nutrition are reviewed in the light of the newer knowledge of the chemical structure of proteins. "The possibilities of protein synthesis in animals and the conditions which this postulates; the significance of the availability, palatability, and physical texture of the food intake; the suggested rôle of various accessories—inorganic salts, lipoids, etc.; the distinction between the nutritive demands during the period of growth and those of later adult life, are brought within the range of discussion."

A large number of experiments are reported with white rats to determine whether animals can be maintained in nitrogen equilibrium and health for long periods on a diet consisting of a constant mixture of pure foodstuffs, including a single proteid. "Numerous experiments are reported in which casein formed the sole nitrogenous constituent of the dietary. In this connection it is shown that the make-up of the inorganic constituents of the diet exercises an influential effect on the nutritive efficiency of the dietary. From the experience thus gained a 'basal' ration was constructed on which rats were kept many months in good health. Some of these experiments in which the animals exhibited no noteworthy alterations in weight and showed a good gain in nitrogen are, as far as the authors are aware, the most successful recorded attempts at artificial nutrition with a constant mixture of pure foodstuffs, containing only a single protein. Satisfactory experience also followed the gradual complete substitution of the casein by other proteins, one animal continuing more than 217 days on a diet in which the sole protein was glutenin."

Relation between the digestibility and the retention of ingested proteins, D. D. VAN SLYKE and G. F. WHITE (*Jour. Biol. Chem., 9 (1911), No. 3-4, pp. 219-229*).—The rate of nitrogen excretion was studied on different diets by collecting urine at intervals and determining its nitrogen content, the rate of nitrogen excretion being taken as an idex of the rate of absorption in the intestine. Adding starch to the diet decreased the rate of nitrogen metabolism but did not affect the completeness of absorption. With the foods tested nitrogen excretion occurred most rapidly after the ingestion of cod. The lower cleavage products appear to be less capable than the higher cleavage products of maintaining nitrogen equilibrium.

The chemical and energy transformations in the dog after the ingestion of different quantities of meat, H. B. WILLIAMS, J. A. RICHE, and G. LUSK (*Proc. Soc. Expt. Biol. and Med., 8 (1911), No. 3, pp. 61, 62*).—Experimental data are summarized and briefly discussed.

Calcium metabolism.—II, The calcium content of human blood after oral administration of large doses of calcium, N. VOORHOEVE (*Biochem. Ztschr., 32 (1911), No. 5-6, pp. 394-409*).—The daily administration of 2.727 gm. of calcium oxid in the form of lactate or chlorid increased the calcium content of the blood of a man on a diet rich in calcium. Under similar conditions 0.545 gm. of calcium oxid did not cause a very appreciable increase.

Certain fundamental principles relating to the activity of bacteria in the intestinal tract—their relation to therapeutics, A. I. KENDALL (*Jour. Med. Research, 25 (1911), No. 1, pp. 117-187*).—From a consideration of available data and the results of a number of experiments with infants with bacillary dysentery, the author concludes that carbohydrates protect protein in bacterial growth, a conclusion similar to a theory quite commonly accepted in animal nutrition.

"Bacteria in the presence of protein, or protein decomposition products, and fermentable carbohydrate act upon the carbohydrate in preference to the protein, because utilizable carbohydrate shields protein from bacterial attack."

The data presented are discussed chiefly with reference to their bearing upon diet in disease.

"The harmful effects of bacteria are associated to a considerable degree with their action upon protein; it can be shown experimentally that the organism concerned in the production of bacillary dysentery act thus, and it can further be shown that the introduction of utilizable carbohydrate tends to prevent this elaboration of putrefactive or toxic products."

A bibliography is appended to the paper.

The effect of the environment of carbonated beverages on bacteria, C. C. YOUNG and N. P. SHERWOOD (*Jour. Indus. and Engin. Chem., 3 (1911), No. 7, pp. 495, 496*).—Investigations were undertaken to determine whether or not any pathogenic organism could withstand the unfavorable environment of bottled carbonated beverages a sufficient length of time to reach the consumer. It was found that the number of organisms in the beverages examined was extremely small except for those which had been introduced.

"There was a decided reduction in number of the organisms introduced, owing to standing 244 hours uncarbonated.

"There was a very marked reduction in numbers of all three organisms introduced, and especially of *Bacillus typhosus*, owing to conditions existing in the carbonated bottles.

"There was not a complete killing out of the organisms introduced, during the entire experiment.

"*B. prodigiosus* and *B. coli* seemed to be somewhat more hardy than *B. typhosus*.

"Undoubtedly the longevity of *B. typhosus* depends in a great measure upon the virulence of the organism, and as the results above show that some of the organism will live longer than the beverage is normally on the market, the manufacturer should not depend upon the percentage of reduction caused by the carbon dioxid and other substances used.

"From the observation that the most hardy individuals can resist these adverse conditions for a considerable length of time, the logical conclusion is that no water should be used in the manufacture of a carbonated drink that is in the least suspicious, and if a doubtful water is the only source of supply, this should be subjected to treatment by some method of sterilization with subsequent filtration through a trustworthy and efficient filter."

A study of the influence of rice diet and of inanition on the production of multiple neuritis of fowls and the bearing thereof on the etiology of beriberi, W. P. CHAMBERLAIN, H. D. BLOOMBERGH, and E. D. KILBOURNE (*Philippine Jour. Sci., B. Med. Sci., 6 (1911), No. 3, pp. 177–209, pls. 4, dgms. 5*).—From the experimental evidence the conclusion was reached that fowls developed multiple neuritis "when fed exclusively on polished rice, whether Filipino No. 1 or Saigon choice rice is used. . . .

"Those fowls that voluntarily eat heartily of polished rice are able thereby to maintain their body weight and to defer or to prevent the development of multiple neuritis.

"The administration of certain inorganic salts of phosphorus and of potassium, either alone or combined, to fowls subsisting on polished rice neither prevented multiple neuritis nor deferred its onset."

Fowls fed unhusked rice, or undermilled (unpolished) rice, did not acquire the disease, nor did those fed on undermilled rice combined with large amounts of sodium chlorid.

"Fowls from which all food is withheld and only water allowed, develop multiple neuritis in some cases.

"Fowls starved on reduced amounts of a neuritis-preventing undermilled rice acquire multiple neuritis in some cases. . . .

"The signs, symptoms, and nerve appearances are identical in neuritis produced by inanition and in that caused by feeding polished rice. . . .

"In neuritis-producing rice and in beriberi-producing dietaries both the phosphorus and the potassium are markedly reduced in amount, the latter in greater degree than the former.

"As an index of the beriberi-producing power of a given rice, reduction in the potassium content is probably quite as reliable as reduction in the phosphorus content."

Practical experiences with beriberi and unpolished rice in the Philippines, V. G. HEISER (*Philippine Jour. Sci., B. Med. Sci., 6 (1911), No. 3, pp. 229-233*).—Information is summarized regarding the efforts made to encourage the use of unpolished rice in the Philippines and the success which has attended it.

For purposes of convenience "a rice containing less than 0.4 per cent of phosphorus pentoxid is regarded as polished and that which contains a greater percentage of phosphorus pentoxid as unpolished rice."

An attempt to secure legislation regarding the use of unpolished rice in the Philippines is briefly discussed.

Studies on the protective power of bran in a polished rice diet, L. BREAUDAT (*Bul. Soc. Path. Exot., 4 (1911), No. 7, pp. 498-502*).—In experiments with chickens rice bran and a corresponding amount of an aqueous extract of rice bran exercised a protective effect. A study of the nitrogen content showed that the protective power was not directly ascribable to the additional amount of nitrogen supplied. The absence of fat, cellulose, starch, etc., in the extract was additional evidence of the inactivity of these substances in preventing disease ascribable to the use of polished rice in large proportion.

Digestion in fever, J. B. NICHOLS (*Amer. Jour. Med. Sci., 142 (1911), July, pp. 93-95*).—From a summary of data on the subject the author concludes that the average reduction of digestion during fever is not over 5 to 10 per cent. The bearing of these facts on feeding in fever is discussed.

Organic matter in the expired breath, M. J. ROSENAU and H. L. AMOSS (*Jour. Med. Research, 25 (1911), No. 1, pp. 35-84, figs. 5*).—Using the reaction of anaphylaxis, the authors conclude from experiments in which the liquid obtained by condensing the moisture from the expired breath of man was injected into guinea pigs that the presence of organic matter in expired breath has been demonstrated.

"The logical conclusion from our results is that protein substances under certain circumstances may be volatile. It seems unlikely that such a complex molecule should possess the power of passing into the air in a gaseous form. The volatility, however, now in question may resemble that solubility which deals with particles in suspension in a physico-chemical state (colloidal suspension). The protein may simply be carried over in 'solution' in the watery vapor.

"Our experiments are too few to state that albuminous substances such as egg white, milk, or blood serum in vitro is 'volatile.' However, they are sufficiently suggestive to stimulate further work along this line."

A few experiments to determine the effect of time, temperature, acids, and alkalis upon the organic matter in the expired breath are recorded, but the data are regarded as too limited to warrant conclusions. "It is of practical importance to collect further information along these lines. It would also be interesting to study the organic matter in the expired breath in health and disease; in different ages, etc. . . .

"The fact that the expired breath contains definite amounts of specific organic substances will also have an immediate bearing upon the problems of ventilation and the effects of vitiated air. There has recently been a growing tendency to regard the ill effects of vitiated air as due to the increased temperature and moisture, but it is now apparent that there are other factors which must be taken into account."

A respiration calorimeter of the Atwater-Rosa-Benedict type designed for use with dogs and children; with demonstration, H. B. Williams (*Proc. Soc. Expt. Biol. and Med., 8 (1911), No. 3, p. 61*).—A brief account of the completion of a respiration calorimeter of suitable size, and with special modifications, for the study of the gaseous exchange and energy metabolism of infants and small animals.

Origin and development of the nutrition investigations of the Office of Experiment Stations, C. F. Langworthy (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1910, pp. 449–460*).—Early nutrition work in the United States is considered as well as the origin of the nutrition work of this Department, its scope, the number and character of the publications which have been issued, and the practical results of the investigations.

ANIMAL PRODUCTION.

Lectures on biology, C. Thesing, trans. by W. R. Boelter (*London, 1910, pp. VIII+334; rev. in Nature [London], 86 (1911), No. 2172, pp. 510, 511*).—This is a translation of a German work (Biologische Streifzüge), which is a modern presentation of the biological investigations on variation, heredity, and adaptation, with a discussion of their value from the standpoint of philosophy.

Parthenogenesis, A. Lécaillon (*Bul. Sci. France et Belg., 44 (1910), No. 3, pp. 235–237*).—A discussion of natural rudimentary parthenogenesis, total parthenogenesis, and studies of experimental parthenogenesis in different species of animals. A bibliography is appended.

On germinal transplantation in vertebrates, W. E. Castle and J. C. Phillips (*Carnegie Inst. Washington Pub. 144, 1911, pp. 26, pls. 2*).—This contains further details (E. S. R., 21, p. 669) on transplanting undeveloped ovaries in guinea pigs and rabbits and of testicles in rats. In the guinea pigs there were 2 cases where young were produced from the grafted tissue. The influence of the foster mother was negative in one case, and the other case was rejected because the apparent positive evidence can be accounted for as a recessive character.

The authors review the work of other investigations on ovarian and testicular transplantation (E. S. R., 24, p. 576) in poultry, mammals, and human beings. A bibliography is appended.

On evidence of some influence on offspring from engrafted ovarian tissue, C. C. Guthrie (*Science, n. ser., 33 (1911), No. 856, pp. 816–819*).—A discussion of the work of Castle, noted above.

The transplantation of ovaries in chickens, C. B. Davenport (*Jour. Morph., 22 (1911), No. 1, pp. 111–122*).—The author performed 6 experiments in removing ovaries of hens and transplanting them to dissimilar hens, but found no evidence that the engrafted ovary ever became functional, as the more or less completely extirpated ovary regenerated and produced an abundance of eggs. There was no noticeable effect on the soma of the foster mother by the introduced germ plasm.

The fate of ovarian tissues when planted on different organs, C. R. STOCKARD (*Arch. Entwickl. Mech. Organ., 32 (1911), pt. 2, pp. 298–307, pls. 3, figs. 2*).—With guinea pigs transplanted ovarian tissue did not live long, though longer when planted into the testicles than in the other organs. The fate of the transplanted tissues of salamanders depended largely upon the nature of the organ upon which the tissue was transplanted.

The regulatory process in organisms, C. M. CHILD (*Jour. Morph., 22 (1911), No. 2, pp. 171–222*).—A discussion of the significance of important work by different investigators on a wide range of phenomena of plants and animals, commonly called "regulation." The organism is regarded as a physico-chemical system, with no necessity of assuming entelechy or other vitalistic hypotheses. The processes of metabolism in the single cell, known as chemical reactions, are considered as of the same nature as the regulation of vital organs, regeneration of lost parts, and reproduction; the processes of physiological equilibrium and equilibration constituting the phenomena of regulation, which is the fundamental problem of life.

"All of our experimental investigations of living organisms are directly concerned with the problem of regulation in one way or another. In fact, there are only two possible methods of investigating and analyzing the phenomena of life; one is concerned with regulation in the living organism, the other with the observation and analysis of results of stopping the life processes at this or that particular point."

Further remarks on the chemical mechanics of cell division, T. B. ROBERTSON (*Arch. Entwickl. Mech. Organ., 32 (1911), pt. 2, pp. 308–313*).—Various sources of error in McClendon's experiments (E. S. R., 24, p. 575) are pointed out, and it is shown that oil droplets do not divide in alcohol-water mixtures containing more than 50 per cent of alcohol because of the presence of the alcohol and not because they are submerged. Results of the author's experiments convince him that cell division is attributable to an equatorial diminution of surface tension, and he states that cell division due to an equatorial increase in surface tension is hydromechanically untenable.

Mitokinetism in the mitotic spindle and in the polyasters, M. HARTOG (*Arch. Entwickl. Mech. Organ., 27 (1909), pt. 1, pp. 141–145, figs. 6*).—A reply to objections which have been raised by Baltzer to the author's account of the forces involved in mitosis.

The continuity of mitochondria through successive generations and its significance, M. E. FAURÉ-FREMIET (*Anat. Anz., 36 (1910), No. 5–7, pp. 186–191, figs. 3; abs. in Jour. Roy. Micros. Soc. [London], 1911, No. 2, p. 190*).—The development of mitochondria was found to accompany cell division and a continuity was thus established. There is a discussion as to their importance as carriers of heredity.

Some cytological corrections, L. C. BRAGG (*Amer. Breeders Mag., 2 (1911), No. 1, pp. 74–76*).—The three errors referred to, which still pass as facts in most text-books on cytology and heredity, are (1) that there are a specific number of chromosomes in the germ cells of organisms, (2) that the gametes have an equal number of chromosomes, and (3) that the chromosomes may be used by the taxonomist in classification.

Chromosomes as bearers of heredity, H. E. ZIEGLER (*Jahresh. Ver. Vaterländ. Naturk. Württemb., 67 (1911), pp. 488–495, figs. 4*).—Affirmative evidence is cited to substantiate the view that inherited traits are chiefly transmitted by means of the chromosomes. Examples are given of the possible combinations and probable percentages of inheritance of characteristics, assuming that the germ cells of both parents contain 12 chromosomes each.

Studies on chromosomes.—VII, A review of the chromosomes of Nezera; with some more general considerations, E. B. Wilson (*Jour. Morph., 22* (*1911*), *No. 1, pp. 71–110, pl. 1, figs. 9*).—In the latter part of this paper the author summarizes, under the following headings, the work on chromosomes which he has reported at various times and places for the past 6 years: (1) The idiochromosomes, (2) composition and origin of the X Y pair, (3) modifications of the X element, (4) sex limited heredity, and (5) secondary sexual characteristics.

Though believing that in the chromosomes we have the mechanism which may explain some of the phenomena of heredity, he does not think that they are the exclusive factors of determination. Sex limited heredity is seen to run parallel to the distribution of definite structural elements, and there is a remarkable consistency of the chromosome relation in the species. Skepticism regarding it is said to have no justification, though individual fluctuations do occur.

[**The inheritance of complex growth forms, such as stature, and Mendel's theory,**] J. Brownlee (*Proc. Roy. Soc. Edinb., 31* (*1910–11*), *No. 2, pp. 251–256*).—The inheritance of complexes is illustrated by assuming a simple case where two races mix in equal numbers and the property in question depends upon two elements, and it is thereby shown that there is nothing necessarily antagonistic between the evidence advanced by the biometricians and the Mendelian theory.

"If the inheritance of stature depends upon a Mendelian mechanism, then the distribution of the population as regards height will be that which is actually found, namely, a distribution closely represented by the normal curve. There is nothing in the values of the coefficients of inheritance found by Sir Francis Galton and Professor Pearson which can not be explained on the basis of Mendelian inheritance."

The inheritance of the peculiar pigmentation of the Silky fowl, W. Bateson and R. C. Punnett (*Jour. Genetics, 1* (*1911*), *No. 3, pp. 185–203*).—This is a study of the inheritance of the black pigment which is generally distributed among most of the mesodermal tissues of the body in Silky fowls.

Offspring of a Silky hen crossed with a Brown Leghorn male which never had this pigment possessed but little pigmentation, whereas those of the reciprocal crosses were strongly pigmented.

On breeding the F_1 birds together there resulted chicks of various grades of pigmentation, ranging from the deepest pigment to none at all. The F_2 generation, however, presented certain distinctions according as a pigmented or nonpigmented F_1 hen was used. When the F_1 female was crossed with the Brown Leghorn male none of the offspring was deeply pigmented, and this was true for the pigmented F_1 female as well as for the unpigmented. But when the F_1 male was crossed with a Brown Leghorn female about 1 in 8 of the offspring was deeply pigmented, and these were always females. Apparently there was a pigmentation factor, an inhibition factor, and a sex factor.

The Brown Leghorn male was homozygous for the inhibiting factor, and the female is, according to the hypothesis of the authors, always heterozygous for this factor. Because of certain exceptions to these results the authors are inclined to think that upon occasion the repulsion between factors may be imperfect, though it is not known whether this imperfection is sporadic or a part of some orderly scheme.

A Silky male was mated to a white Rosecomb bantam, and the results show that although the strain of Brown Leghorns was homogeneous in respect to the factor modifying pigmentation, yet its behavior with regard to the Silky pigmentations was not necessarily typical of breeds with unpigmented shanks.

On the inheritance of the webfoot character in pigeons, J. L. BONHOTE (*Proc. Zool. Soc. London, 1911, I, pp. 14–19, figs. 2*).—A report of work which confirms the results of others that the webfoot behaved as a Mendelian recessive, but in which the normal course of Mendelian inheritance was distorted when two strains of webfeet were mated, although each strain by itself bred true. "We must, therefore, be driven back to the suggestion that a factor composed of two parts (cryptomeres), one of which is contained in each strain, causes the web to be suppressed or concealed."

[Experiments in pheasant breeding], R. H. THOMAS (*Proc. Zool. Soc. London, 1911, I, pp. 6–9*).—*Thaumalea obscura* appeared to be a hybrid recessive mutation, breeding true, and was produced by crossing *T. amhersti* and *T. picta*. "By whatever name it is called, this hybrid is undoubtedly a homozygote for pattern and color, pure and permanent, transmitting these characters to its descendants. Cross-breeding between these two varieties of *Thaumalea* produces a new form, owing possibly to the meeting of characters never previously combined, and as they are constant it is evident these have an affinity and have become inseparable.

"On such lines evolution might be conceived as having proceeded fairly rapidly towards the separation of species."

Investigations in North America on current problems of inheritance, E. VON TSCHERMAK (*Schr. Ver. Naturw. Kenntnisse Wien, 51 (1910–11), pp. 49–74*).—A popular account of methods and results accomplished in North America by experiments in hybridizing and selecting.

Heredity and evolution, L. PLATE (In *Festschrift Richard Hertwig. Jena, 1910, vol. 2, pp. 535–610, pl. 1, figs. 3; abs. in Jour. Roy. Micros. Soc. [London], 1911, No. 4, p. 453*).—Breeding experiments with mice led the author to have complete confidence in the Mendelian theory of the purity of gametes, and he maintains that Mendelism does not lessen the importance of selection, the conception of determinants being quite consistent with the transmission of acquired characters. Seven different modes of germinal variation and five kinds of atavism are given in an analysis of correlation. The author "proposes to modify Bateson's 'presence and absence' theory into a 'grundfaktor supplement-theorie.'"

Evolution, P. GEDDES and J. A. THOMSON (*London, [1911], pp. 256*).—A resumé of the evidence of the evolution of species as gathered from the study of variation, heredity, embryology, and paleontology.

Bibliographia evolutionis (*Bul. Sci. France et Belg., 44 (1910), Bibliogr. Evolutionis, 1 (1910), pp. 162*).—This is a bibliography of current works on heredity, variation, general cytology, experimental biology, and related topics, with abstracts of each noted. It is appended to each number of the journal, with separate pagination.

Commercial feeding stuffs, W. J. JONES, Jr., F. D. FULLER, and C. CUTLER (*Indiana Sta. Bul. 152, pp. 167–403, fig. 1*).—This contains a summary of the state feeding stuffs law, rulings made under it, a classification of feeding stuffs, and similar data. Analyses are reported of 2,533 samples of feeding stuffs, including the by-products of wheat, rye, buckwheat, corn, flax, oats, and cottonseed; distillers' grains, brewers' grains, sugar beet pulp, alfalfa products, animal by-products, and condimental, poultry, and mixed feeds.

Commercial feeding stuffs of Pennsylvania in 1910, J. W. KELLOGG ET AL. (*Penn. Dept. Agr. Bul. 208, pp. 213*).—Analyses are reported of cotton-seed meal, linseed meal, corn-oil meal, distillers' grains, brewers' grains, malt sprouts, gluten feed, hominy feed, corn bran, alfalfa meal, beet pulp, beef scrap, meat meal, mixed feeds, and by-products of wheat, rye, and buckwheat.

[Analyses of feeding stuffs] (*Ber. Agr. Chem. Kontroll u. Vers. Stat. Pflanzenkrank. Prov. Sachsen, 1910, pp. 22–38, 45–58*).—Analyses are reported of cotton-seed meal, peanut meal, coconut meal, linseed meal, poppy-seed meal, palm-nut meal, rape-seed meal, sesame-oil meal, sunflower meal, rice meal, rye bran, wheat bran, distillery slop, brewers' grains, malt germ, homco, maize product, molasses feeds, blood meal, fish meal, meat meal, peanut bran, fodder beets, potato tops, potato flakes, potato chips, millet bran, millet polish meal, dried beet leaves, seed beet straw, soy-bean meal, mixed feeds, barley, oats, lupines, rye, wheat, hay, and by-products from the manufacture of starch. Botanical analyses were made of many of these feeding stuffs in order to determine the admixture of weeds and other foreign substances.

Analyses of feeding stuffs, H. Immendorff (*Ber. Landw. Vers. Stat. Univ. Jena, 1910, pp. 11–14*).—Analyses are reported of cotton-seed meal, peanut-cake meal, palm nut-cake meal, linseed meal, rice meal, dried brewers' grains, and sesame cake.

Preservation of beet pulp by the lactic ferment, L. Malpeaux (*Betterave, 20 (1910), No. 516, pp. 340–344; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 15, pp. 971, 972*).—When beet cossettes were inoculated with "lacto-pulp" it was found that there was but little difference in the composition from the uninoculated, there being only a slight loss in the amount of dry substance. The cellulose, carbohydrate, nitrogen, and ash content all decreased. The disagreeable odor sometimes given off by beet silage was suppressed by inoculation. When fed to lambs the preserved pulp gave satisfactory results.

Digestion experiments with bananas, M. Zagorodsky (*Tropenpflanzer, Beihefte, 12 (1911), No. 4, pp. 327–341*).—A report of digestion experiments conducted by Honcamp with 2 sheep, in which the basal ration consisted of clover hay and soy-bean meal.

The average coefficients of digestion were as follows: With banana meal, organic substance 75.9, dry matter 76.3, fat 100, and nitrogen-free extract 84.7; with banana peel meal, organic substance 66.9, dry matter 68.8, protein 34.1, fiber 22.1, fat 40.5, and nitrogen-free extract 80.1. Analyses are also given.

Report of work at Kodiak live stock and breeding station, M. D. Snodgrass (*Alaska Stas. Rpt. 1910, pp. 63–65, pl. 1*).—An account of progress made at the station in a study of the conditions affecting the rearing of live stock in Alaska along the lines noted in previous years.

The station herd of cattle at the time of the report consisted of 59 head of pure-bred Galloways and 10 cross-bred Galloway-Natives. During the year 40 head of Alaska-born grade ewes were purchased. They are a mixture of Cotswold, Shropshire, and other black-faced sheep, coming originally from the range sheep of the Northwest States and have proved well adapted to the climate. They are larger and longer wooled than is usually found on the ranges, and a more hardy sheep. The ewes sheared from 5 to 12 lbs. of wool per head, an average of 7.4 lbs. per head. The wool was of good quality and much cleaner than that from the ranges in the States, being practically free from sand and dirt. The sheep range for 11 months of the year and require very little feeding and shelter, except during the heaviest snowstorms.

Notes on hay making and the putting up of silage are also given.

The present and future of stock raising in Algeria, R. Marès (*Bul. Agr. Algérie et Tunisie, 17 (1911), No. 5, pp. 101–116; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 4, pp. 902, 903*).—A general and statistical account. The breeds of live stock are briefly described.

The influence of type and of age upon the utilization of feed by cattle, H. P. ARMSBY and J. A. FRIES (*Pennsylvania Sta. Rpt. 1910, pp. 324–606, pls. 17, fig. 1; U. S. Dept. Agr., Bur. Anim. Indus. Bul. 128, pp. 245, pls. 3, figs. 17*).—This contains a more detailed account of work previously noted (E. S. R., 24, p. 468).

Measurements of the experimental animals made from day to day show that the body of the pure-bred steer was longer at the start, but that after irregularities of the first 6 months both animals gained in length at a similar rate for the next 6 months, after which time the growth of the pure-bred steer was much less rapid than that of the scrub steer so that the former was finally overtaken. At the beginning of the experiment both steers were about the same height, but the scrub steer increased more rapidly than the pure bred and the rate of increase diminished in both animals as they grew older. The chest girth of the scrub was less than the pure bred at first, but its growth was in this respect more rapid for about 18 months. The increase in weight of the pure-bred steer was due much more largely than that of the scrub to an increase in size of the body. After slaughtering, the carcass of the pure bred was rated as prime and the scrub as common and there was a much higher percentage of dressed weight in the former and likewise the predominancy of the loin cut over the less valuable cuts of the forequarter as compared with the scrub. The scrub steer made relatively greater gains in live weight and required on the average a smaller amount of air-dried feed to produce a unit of gain, and a greater tendency toward gain of protein tissues than the pure bred.

Different amounts of hay were fed each year, one being slightly below the maintenance requirements and the other considerably below it, and designated maintenance and submaintenance rations, respectively, without implying that the former was an exact maintenance ration. The digestibility of the crude fiber of the hay was less in every instance, and that of the nitrogen-free extract in every case but one upon the heavier of the 2 rations, while the percentage of digestibility of the organic matter and total dry matter was less on the heavier ration. The same was true of the total carbon and total energy, but in 4 cases out of 6 the digestibility of the protein as here computed, assuming the nonprotein to be entirely digestible, was greater in the heavier ration, and the same was true of the total nitrogen, although the cases were not identical with those under protein. Ether extract in all cases showed a higher digestibility in the heavier rations.

The scrub consumed in every case relatively more hay, so it would be expected that any effect of the quantity of hay consumed would be to lower the digestibility, but the contrary was actually found to be the case the first 2 years, and this was true of the total dry matter, the organic matter, the crude fiber, the nitrogen-free extract, the carbon, and the energy with but a single exception—the energy of the submaintenance ration of 1905. In the third season the pure-bred steer seemed to have overtaken the other as regards the ability to digest hay, but the difference in every case was slight. The percentage of digestibility appeared to increase from year to year with both animals, the most striking difference being the notable increase in the digestibility of the nonnitrogenous ingredients in 1907 as compared with 1906.

In 1905 wheat bran constituted the exclusive grain ration; in the other 2 years the grain consisted of a mixture of bran, corn meal, and old-process linseed meal 1:3:3. The digestibility of the bran was greater on the heavier ration, with the exception of the ether extract, total carbon, and organic hydrogen in the case of the pure-bred steer, but the differences were small. With the mixed grain feed the results were contradictory. There was but very little difference between the 2 animals.

In consequence of the relatively small losses in the feces observed in 1907, the total energy of the hay which was metabolizable was higher than in the two previous years, the averages for both animals being as follows: 1905, 40.11 per cent; 1906, 41.2 per cent; and 1907, 45.63 per cent, and the percentage of "digested" energy metabolizable, 1905, 79.99; 1906, 79.73; and 1907, 78.34 per cent. There was but very little apparent difference between the 2 animals as respects the percentage of energy metabolizable. The average results of the availability of metabolizable energy is shown in the following table:

Percentage availability of metabolizable energy.

Ration.	Pure-bred steer			Scrub steer.		
	1905	1906	1907	1905	1906	1907
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Timothy hay...	60.51	71.49	57.05	55.21	60.86	56.50
Wheat bran......	58.74	....	....	51.98	...	..
Mixed grain..........	.....	58.89	61.55	....	51.51	57.71

The energy values of the feeding stuffs, technic employed, and method of feeding during intermediate periods are also given in detail.

Feeding experiments with beef cattle, R. S. CURTIS (*North Carolina Sta. Bul. 218, pp. 29-44, figs. 10*).—The object of these experiments was to determine the difference in feeding value of corn stover, corn silage, and cotton-seed hulls when fed with cotton-seed meal. Western North Carolina steers, principally Shorthorn grades and weighing about 900 lbs., were used, and the same amount of cotton-seed meal was fed to each of the three lots. The feeds used were rated per ton as follows: Cotton-seed meal $30, cotton-seed hulls $8, corn silage $2.75, and corn stover $8. In figuring the profits manure produced was credited at $2 per ton.

Three lots of steers were fed for 112 days during the winter of 1909–10 an average of 8.14 lbs. cotton-seed meal per steer daily. In addition the steers in lot 1 were fed 16.52 lbs. corn stover and 23.17 lbs. corn silage; lot 2 was fed 35.36 lbs. corn silage; and lot 3, 17.92 lbs. cotton-seed hulls per steer daily. Lot 1 made an average daily gain of 1.31 lbs. at a cost of 17.94 cts. per pound and were fattened at a profit of $6.74 each. The corresponding figures for lot 2 are 1.35 lbs., 16.02 cts., and $9.20, and for lot 3, 1.43 lbs., 16.07 cts., and $8.58. These steers were bought at $4 and sold at $5.75 per hundred pounds live weight. During the winter of 1910–11 3 lots of steers were fed for 112 days an average of 6.77 lbs. cotton-seed meal daily per steer. In addition lot 1 received daily 20.8 lbs. corn stover and 23.64 lbs. corn silage; lot 2, 32.55 lbs. corn silage; and lot 3, 21.6 lbs. cotton-seed hulls. These steers cost $4.50 per hundred pounds. Lot 1 gained 1.3 lbs. daily at a cost of 17.17 cts. per pound, sold at $5.90, and made a profit of $1.99 each. Lot 2 gained 1.23 lbs. each daily, at a cost of 15.11 cts. per pound, sold at $6.00, and made a profit of $6.79 per steer. Lot 3 gained 1.45 lbs. each daily at a cost of 14.19 cts. per pound, sold at $5.725, and made a profit of 31 cts. per steer.

Though in each case the steers fed cotton-seed meal and hulls gained more than the other lots, the author states that the quality of the carcass was not as desirable, nor was the dressing percentage as high as that for the two lots receiving silage and stover. The statement is made that the high cost of gains made by these steers was partially due to using a grade of steers inferior in breeding and in gaining qualities, and that high-grade feeders properly fed should make double these gains, reducing the cost one-half.

Feeding and management of beef cattle, R. S. CURTIS (*North Carolina Sta. Bul. 219, pp. 51–68, figs. 11*).—This is a popular account of the beef cattle industry of North Carolina.

More care in the selection of feeding cattle is urged and, on account of the large amount of cotton-seed meal usually fed under southern conditions, short feeding periods ranging from 100 to 120 days are suggested. The use of corn silage and other home-grown feeds is advocated. It is stated that the most satisfactory financial results are usually obtained by selling the finished cattle at home, though shipping under certain conditions may prove advisable. Some of the disorders incident to the finishing of beef cattle are noted.

Contribution to the physiology of the nutrition of growing animals.—II, The utilization of the protein in milk by calves, G. FINGERLING (*Landw. Vers. Stat. 74 (1910), No. 1–2, pp. 57–80*).—Digestion experiments showed that as the calves grew older they needed a smaller percentage of protein. When given whole milk a large percentage of the protein was excreted. For economical gains easily digested fats and carbohydrates should be added to the milk after the first few weeks.

On the gain in protein in fattening full-grown wethers, T. PFEIFFER and K. FRISKE (*Landw. Vers. Stat., 74 (1911), No. 6, pp. 409–465*).—Full-grown wethers when fattened showed a gain in nitrogen in the form of flesh on both wide and narrow rations, this gain being much faster when the animals had previously been kept in a poor condition. As in a previous report (E. S. R., 22, p. 473) the metabolism experiments indicated a higher gain in nitrogen than did the slaughter tests, and this difference was greater on a narrow than on a wide ration. Though most of the loss in nitrogen took place during the drying of the feces, it is pointed out that probable further loss of nitrogen as ammonia takes place from the lungs and skin and as a gas in the intestinal canal.

Lambs on rape: Shorn v. unshorn, T. W. LONSDALE (*Jour. New Zeal. Dept. Agr., 3 (1911), No. 2, p. 109*).—Twenty wethers 12 weeks from shearing were put on rape and allowed the run of a grass paddock adjoining. They made an average gain in 12 weeks of 2.75 lbs. each more than a similar lot of unshorn lambs.

Fecundity of sheep, J. R. AINSWORTH-DAVIS (*Ann. Sci. Bul. Roy. Agr. Col. Cirencester, 1910, No. 2, pp. 94–96*).—A study of the twinning ability in pure-bred Oxford Down sheep.

In 1909 12 pedigree Oxford Down twin theaves were purchased, 6 from mixed twins and the other 6 from ewe twins. These were mated in 1910 and 1911 with a pedigree Oxford Down ram. Although the experimental flock is small, the results for 2 years were as follows: All the twins were borne by ewes from mixed twins; the twins were predominantly mixed, and there was no case of ram twins; the ewes which were originated from mixed twins produced, taking twins and singles together, twice as many ewe lambs as ram lambs; the ewes from the ewe twins nearly all produced ram lambs.

The effect of food on the strength, size, and composition of the bones of hogs, E. A. BURNETT (*Nebraska Sta. Rpt. 1910, pp. 178–208, figs. 3*).—A report of experiments in continuation of those already reported (E. S. R., 20, p. 868).

In a test with 41 pigs fed at the North Platte Substation in 1908–9, the average breaking strength of all the bones tested (femur, tibia, humerus, and radius and ulna), per 100 lbs. live weight, for the different lots was as follows: On ground corn 465 lbs.; on ground corn and alfalfa meal 9:1, 397 lbs.; on ground corn, alfalfa meal, and tankage, 85:10:5, 499 lbs.; on ground corn, alfalfa meal, and bone meal 85:10:5, 573 lbs.; and on ground corn, alfalfa meal, and shorts 75:10:15, 470 lbs.

In a test with 14 pigs at the central station in 1909–10, the average figures for the different lots were as follows: On ground corn, 272 lbs.; ground corn, alfalfa meal, and bone meal 85.5:10:4.5, 384 lbs.; on ground corn and alfalfa meal 9:1, with 1.5 per cent calcium carbonate for one month, 275 lbs.; on ground corn, alfalfa meal, and crystallized disodium phosphate, 86.6:10:3.4, 301 lbs.; and on ground corn, alfalfa meal, and tankage 85.5:10:4.5 per cent, 276 lbs.

The wall thickness, the percentage of mineral matter, and, except with the corn-fed lot in 1908–9, the specific gravity varied with the breaking strength. The relation of length, circumference, and volume to the breaking strength was not well marked.

"In both tests the weakest bones were those from the hogs fed corn only. The addition of alfalfa meal slightly increased the strength. The further addition of shorts gave a noticeable increase, while the addition of tankage and especially of bone meal gave a very marked increase."

Swine breeding, F. Hoesch (*Die Schweinezucht. Hanover, 1911, vol. 1, pp. XIII+476, figs. 113*).—The first volume of this work treats of the natural history of the Suidæ, the domestication of different species by man, and the origin and character of the modern breeds of swine.

Training farm for elephants in the Belgian Congo; their utilization in agriculture, Devédeix (*Jour. Agr. Prat., n. ser., 21 (1911), No. 12, p. 369, fig. 1; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 4, p. 906*).—A description of the farm and methods practiced. By making use of the elephant it has been possible to plow vast tracts of land which were formerly unproductive.

Zebras as transport animals (*Agr. Jour. Union So. Africa, 2 (1911), No. 2, pp. 144, 145*).—Experience with zebras as draft animals showed that they pull steadily and respond quickly to the whip. They kept in good condition without corn feeding and appeared more intelligent than mules or donkeys. Although experience so far indicates that they lack in stamina, this is thought to be due in part to the manner of feeding.

Mustard for poultry? Report of an experiment conducted at Llangammarch Wells poultry farm, 1909–10, R. R. Allen (*Sawbridgeworth, England, [1911], 2. ed., pp. 27; abs. Jour. Nat. Poultry Organ. Soc., 5 (1911), No. 1, p. 49*).—Hens fed upon mustard during the winter season produced a much larger number of eggs than without any stimulant, or those which received capsicum as a stimulant. During the warm months the reverse was true, but taking the year as a whole the results for 6 pullets of Buff Orpingtons in each lot were as follows: Ordinary food, 914 eggs; capsicum as a stimulant, 905 eggs; mustard as a stimulant, 1,023 eggs.

Further experiments are contemplated.

The Plymouth Rocks, edited by W. C. Denny (*Quincy, Ill. and Buffalo, N. Y., 1911, pp. 128, pls. 3, figs. 118*).—A series of articles by different authors on the history of the breed, origin of different varieties, and other information regarding the Plymouth Rock fowls.

The Rhode Island Reds, edited by D. E. Hale (*Quincy, Ill. and Buffalo, N. Y., 1911, pp. 86, pl. 1, figs. 76*).—The origin and characteristics of standard types and how to mate a bird for the best results are discussed in a series of articles by different authors.

The Transylvanian naked-neck fowl (*Illus. Poultry Rec., 3 (1911), No. 7, pp. 302, 303, pl. 1; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and*

Plant Diseases, 2 (1911), No. 4, p. 915).—A brief description of this breed, which is common in Austria, Hungary, and the Balkan States.

Maine experiments with cross-bred poultry, J. H. Robinson (*Farm Poultry, 22 (1911), Nos. 8, pp. 206–208; 9, pp. 222–224*).—A review of work previously noted (E. S. R., 23, p. 674).

On the structure and function of the oviduct of the pigeon, B. Hankó (*Állattani Közlem., 9 (1910), No. 1, pp. 26–48; abs. in Zentbl. Allg. u. Expt. Biol., 2 (1911), No. 7–8, p. 200*).—This describes the histology of the oviduct and the physiology of the secretions connected with it. In general there were but slight differences from those previously reported by other observers from studies of the domestic fowl.

Oviposition induced by the male in pigeons, W. Craig (*Jour. Morph., 22 (1911), No. 2, pp. 299–305*).—It was found that pigeons differ from fowls as the male stimulates the female to lay without copulation. In one case stimulation by the hand of man was followed by oviposition. Old females, if kept isolated, refrained from laying. It is concluded that the stimulus to the whole process of egg laying is a psychic stimulant and not dependent upon copulation.

The hygiene of slaughterhouses, Barrier (*Off. Internat. Hyg. Pub. [Paris], Bul. Mens., 3 (1911), No. 3, pp. 451–467; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 5, pp. 1110, 1111*).—A report on the conditions under which licenses are granted to private slaughterhouses.

DAIRY FARMING—DAIRYING.

Care and management of the dairy herd, J. C. McNutt (*North Carolina Sta. Bul. 220, pp. 73–84, figs. 9*).—A popular bulletin dealing with the selection, feeding, and improvement of dairy cows under North Carolina conditions. The feeding of corn silage and other home-grown feeds is urged. The care and management of the herd bull, raising of dairy calves, and the age to breed heifers are discussed.

[Report of dairy work], G. H. True (*Nevada Sta. Bul. 73½, pp. 36–38*).—The yearly records of the cows of the station herd and the best 7-day records are given. In a dairy survey of Douglas County the average production of milk fat in 54 herds was found to be 221.48 lbs. per year, the range being from 91.8 to 317.75 lbs.

A breeder's herd records, G. Harold (*Country Gent., 76 (1911), No. 3059, p. 10, figs. 4*).—Illustrations are given of methods of keeping milk and breeding records on a dairy farm.

Dairying, J. A. Ruddick (*Rpt. Dairy and Cold Storage Comr. Canada, 1911, pp. 15–116, pls. 8*).—This contains data on exports of dairy products in Canada, milk records of dairy herds, cow-testing associations, and related topics.

Milk tests (*Field Expts. Harper-Adams Agr. Col., and Staffordshire and Shropshire, Rpt. 1910, p. 53*).—The average percentage of fat in the milk of the college herd was 3.5 in the morning and 4.04 in the evening milk. The average yield of cheese per gallon of milk was 1.26 lbs. The lowest yield was 1.08 lbs., occurring in June, and the highest 1.48 lbs. in February.

An experimental study of the causes which produce the growth of the mammary gland, R. T. Frank and A. Unger (*Proc. N. Y. Path. Soc., n. ser., 11 (1911), No. 1–2, pp. 4–8*).—To ascertain whether heterologous fetal extracts produced breast hyperplasia, rats were injected with cow's fetuses, rat's fetuses, ovaries, and placentas. Starling's technic was employed, but the results were negative. The same methods were then used with rabbits, using extracts of rabbit's fetuses, ovaries, placentas, and hypophyses. The results varied greatly and showed no correspondence to the tissues used for injection, so that the authors were forced to conclude that there was some unknown factor yet to be accounted for.

Can the fat content of milk be increased by the feed? P. Wauters (*Lait. et Élevage, 6 (1911), Nos. 4, pp. 29–31; 5, pp. 35–37; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 4, p. 894*).—The author's experience for 20 years with a herd of cows led to the conclusion that the diet of the cow has but very little influence on the composition of the milk, although in France the overfeeding of milch cows with watery feeds has been condemned as a fraudulent practice because it is thought to contribute to the deterioration of the milk.

The properties of colostral fat, S. Engel and A. Bode (*Ztschr. Physiol. Chem., 74 (1911), No. 2, pp. 169–174*).—The chemical constants of the colostral fats of several cows were determined from day to day during the period immediately following parturition, with a view to noting the changes from colostral fat to normal milk fat.

The iodin number gradually decreased from day to day. The saponification number remained low for 2 or 3 days, but was gradually raised throughout the period as a whole. The Reichert—Meissl number was more or less irregular, but up to about the fifth day there was an increase and then a slight decrease. The determination of similar constants of goat colostrum showed considerable irregularity.

Bacteria in milk produced under varying conditions, W. K. Brainerd (*Virginia Sta. Rpts. 1909–10, pp. 65–77*).—This is a detailed account of work already reported (E. S. R., 23, p. 381).

Milk with a soapy taste, O. Fettick (*Ztschr. Fleisch u. Milchhyg., 21 (1911), No. 12, pp. 389–392*).—A bacillus 0.82 to 1.5 microns long and 0.3 to 0.5 microns in thickness was found to be the cause of a soapy taste in milk. In pure cultures they formed round, yellowish-brown colonies. The trouble was removed by disinfecting the stable and thoroughly cleansing the milk utensils.

Report on the chemical changes produced in milk by bacteria and their relation to the epidemic diarrhea of infants, H. A. Scholberg and R. L. M. Wallis (*Ann. Rpt. Local Govt. Bd. [Gt. Brit.], 39 (1909–10), pp. 504–543; abs. in Jour. Chem. Soc. [London], 100 (1911), No. 584, II, p. 512*).—In the summer months peptones appeared in fresh samples of milk, the quantity of albumoses and peptones depending upon the age of the milk and on the temperature at which it has been kept. Incubation of milk for from 15 to 24 hours at 37° led to the production of peptones, although longer periods of incubation caused it to disappear. Investigations on the pancreas of infants showed a toxic effect of peptones and the peptone-like substances which were formed by a large number of both sporing and nonsporing varieties. Some of the organisms isolated produced a substance which can replace secretin in pancreatic digestion experiments.

Report upon the bacterial measurement of milk pollution, W. G. Savage (*Ann. Rpt. Local Govt. Bd. [Gt. Brit.], 39 (1909–10), pp. 474–503*).—There was a general agreement between cleanliness in cows' stables and the number of bacteria, so that with a uniform method of determining the bacterial content unsanitary stables and unclean methods of milking should be easily detected by bacterial enumerations.

A study of the influence of time and the temperature at which the milk was kept showed great irregularities in rate of increase of bacterial growth when the milk was kept at 15 and 21° C., but the increase was always faster at the higher temperature. Temperature was found to be a more important factor than the initial number of bacteria in determining the final number of *Bacillus coli*, but both were important. From the few experiments made it seems that time is less important than temperature.

The results of 24 hours' incubation at 15° were similar to those of the same samples after railway transmission, and it is stated that a standard of not more than 1,000 coli and allied organisms per cubic centimeter of milk is reasonably practicable. Experiments also showed very clearly the immense importance of thorough initial cooling of the milk before transportation.

The number of the spores of *B. enteritidis sporogenes* was determined in over 50 samples of fresh milk, and showed a considerable agreement with the number of *B. coli*.

Four experiments were carried out to study the bacterial changes caused by milk filtration, and on the whole no advantage from a bacteriological standpoint was obtained by filtering, although one of the supposed best strainers was employed, the apparatus steamed before each experiment, and the wool used for the filtration of only half a gallon of milk. In an examination of the centrifugalized deposit only 5 out of 50 fresh milk samples were found to contain streptococcus chains, and in only 2 were they present in any numbers. They were present in only a few of the incubated milk deposits.

There was no increase at the end of 24 hours in the acidity of fresh samples of milk incubated at 15°, and in some instances there was an actual decrease of their acidity. Samples incubated at from 20 to 21° showed more frequently an increase, but even at this temperature it was often absent.

A trial of the Schardinger test gave results that were not uniform, but on the whole there was a relation between the reduction time and the freshness of the milk.

No high value was placed on examining incubated milk as to acidity and clotting. If a milk clotted after 6 hours of incubation at 37°, either spontaneously or on heating, the limited tests made showed that at the time of sampling it was bacteriologically unsatisfactory, but the absence of clotting was not any evidence of initial purity.

Some of the general conclusions reached were as follows: The estimation of the number of *B. coli* and allied lactose ferments, the estimation of the spores of *B. enteriditis sporogenes*, and the examination of the stained deposit, are all processes of considerable value in forming a reliable judgment as to the bacterial pollution of milk. The use of milk strainers is discouraged for the following reasons: "They are useless to improve the bacterial quality of the milk; unless great care is taken to keep them scrupulously clean they frequently actually increase the number of bacteria in milk; they encourage the farmer to think that cleanliness precautions can be neglected or at least relegated to a secondary place, since all additions are removed by the strainer. This view has again and again been presented to me by the farmer as an excuse for want of cleanliness in milking."

On the virulence of the lactic ferments contained in the excrements of milch cows, C. GORINI (*Rend. R. Ist. Lombardo Sci. e Let., 2. ser., 43 (1910), No. 18, pp. 777–780; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 2, p. 363; Milchw. Zentbl., 7 (1911), No. 9, pp. 426–429*).—The author isolated several strains of lactic-acid bacteria obtained from the feces of cows in dairies at high altitudes. They possessed such an extraordinary activity that it is thought they should prove valuable as starters, either to hasten the process of ripening or to overcome undesirable species when present.

The score card system of dairy inspection from the national standpoint, G. M. WHITAKER (*Jour. Amer. Pub. Health Assoc., 1 (1911), No. 9, pp. 647–*

653).—A report of progress as to the score card system of inspecting dairies, and its significance in promoting the health of the community by encouraging the production of sanitary milk.

Cooperation for the protection of milk supplies, C. W. Eddy (*Mo. Bul. Ohio Bd. Health, 1* (*1911*), *No. 9, pp. 298–304*).—The purpose of this paper is to point out the vital necessity of cooperation between organized communities in safeguarding the milk supply, so that milk refused by one city for failure to meet its requirements will also be refused by others. When this is not the case the milkman whose milk is rejected may sell the same product elsewhere.

[Results of milk inspection] (*Rpt. Dept. Health Chicago, 1907–1910, pp. 260–285, figs. 3*).—This article contains data on the relative toxicity of raw and pasteurized milks and reports efficiency tests of the different types of pasteurizers. A filtration test of visible dirt in milk is illustrated and described.

Pasteurization of milk in the sealed and final package, J. C. Carter (*Jour. Amer. Pub. Health Assoc., 1* (*1911*), *No. 9, pp. 664–668*).—A method is described for pasteurizing milk after it has been put into sealed bottles. The bacterial content was only from about 800 to 6,000 per cubic centimeter when delivered to city customers.

Sterilizing stations in dairy districts, C. E. North (*Jour. Amer. Pub. Health Assoc., 1* (*1911*), *No. 9, pp. 654–663*).—An account of how a dealer obtained a cleaner milk by offering an extra price of ½ ct. per quart for milk with a low bacterial content. It also cost him 1 ct. per quart to operate a sterilizing station where 4,000 qts. per day were handled, making the total cost 1½ cts. per quart over that of milk shipped in the ordinary way.

The improvement of milk transportation, C. Clément (*Lait. et Élevage, 6* (*1911*), *No. 8, pp. 57–60; abs. in Internat. Inst. Agr.* [*Rome*], *Bul. Bur. Agr. Intel. and Plant Diseases, 2* (*1911*), *No. 4, pp. 908, 909*).—Estimates are given on the cost of transporting milk in Belgium and Prussia, with a view to its reduction. On a consignment of 480 bottles of 125 gm. in pigeon-hole boxes, sent by freight to a distance of 50 km. (31 miles), the charge was 3.4 francs (65.8 cts.) in Belgium, including the return of the boxes with the empty bottles, while the same service in Prussia cost 1.5 francs. A consignment of 128 bottles of 1 liter, sent under the same conditions, cost 3.6 francs in Belgium and 2.25 francs in Prussia.

Does the iron in water affect the quality of butter? W. D. Kooper (*Milch Ztg., 40* (*1911*), *No. 29, pp. 285–287*).—Water containing 36 mg. of iron per 1,000 cc. when added to cream before churning and working produced no off flavor in butter, but when added to sour cream and allowed to stand some time a metallic taste resulted, this being more pronounced in a cream of high acidity. It is pointed out that when other substances which unite readily with iron are present compounds will be formed which produce the metallic taste.

Taylor absorption process for making butter, C. W. Larson (*Pennsylvania Sta. Rpt. 1910, pp. 156–159, pl. 1*).—A report of an experiment in butter making by a patented process, which consists in removing the proteids and sugar which are in solution in the cream by means of an absorption pad instead of a churn. The resulting product, which is rich in milk fat, remains on a separating pad and can be eaten sweet or worked and salted as ordinary butter. "The sweet cream layer as removed from the pan resembled sweet, unsalted butter, but was not as firm in texture as well-made churned butter. The kneaded and salted product when made from ripened cream has the appearance of butter. The flavor was good or bad, depending upon the flavor of the cream used." Analyses of 6 samples of the product showed great variation in all of the constituents.

The following conclusions are drawn: "That with the absorption process a product that resembles butter in flavor, texture and composition can be produced; that where a small amount of a sweet cream product, high in butter fat, is desired, this apparatus may meet a demand; that for producing butter in a commercial way the apparatus used in these tests does not furnish a substitute for the churn; that the product can not be classed as butter under the United States standards of moisture and fat."

Studies of Bitto cheese, G. FASCETTI (*Riv. Sci. Latte, 1 (1911), No. 1, pp. 1–12*).—This cheese, which takes its name from the Valley of the Bitto, a tributary of the Adda, is made principally in 2 types similar to Battelmatt, a fat, soft cheese with holes like Gruyère, weighing from 20 to 25 kg., and Sbrinz or Spalen, a semi-fat cheese weighing from 10 to 30 kg. Originally Bitto was made of four-fifths cow's milk and one-fifth goat's milk. The annual product amounts to about 3,000 quintals (about 330 tons), some of which is consumed fresh and the rest allowed to ripen for a year or two. The texture of the cheese is smooth and the holes, which are 2 to 3 mm. in diameter, are regularly distributed. When 2 years old the cheese is hard, of strong flavor, and the holes become filled with a dense liquid of a pleasant taste. Analyses of 4 samples of Bitto cheese gave the following percentages: Water 31.78, fat 33.59, casein 28.81, and ash 4.83.

The use of steam in the manufacture of Parmesan cheese, A. OLIVA (*Avven. Agr., 19 (1911), No. 3, pp. 106–111; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 4, pp. 910, 911*).—Estimates are given of the comparative cost of heating cheese milk directly by wood fire and by steam. The difference in cost between the two methods is very slight, but the steam installation will also furnish power for churning and gives a larger yield of butter of more even grain than hand labor.

Composition of dried milk powders, A. BURR (*Milchw. Zentbl., 7 (1911), No. 3, pp. 118–133; abs. in Analyst, 36 (1911), No. 423, p. 279*).—Analyses are reported of cream powder, full-milk powder, skim-milk powder, and whey powder.

How to use the Babcock test, J. L. SAMMIS (*Wisconsin Sta. Circ. Inform. 27, pp. 26, figs. 19*).—Directions are given for testing milk, skim milk, buttermilk, whey, and cream on the farm. A form of milk record sheet is illustrated, and methods of calibration of Babcock glassware are given. Rules for calculating dividends by the fat test in creameries are outlined, and several practical problems in calculating milk and cream tests are appended.

VETERINARY MEDICINE.

Report of the veterinary director general and live stock commissioner, J. G. RUTHERFORD ET AL. (*Rpt. Vet. Dir. Gen. Canada, 1909, pp. 212, pls. 26, charts 36*).—This report for the year ended March 31, 1909, includes 19 appendixes. Among the more important contributions presented are the report of the pathologist, by C. H. Higgins (pp. 58–69); dourine (pp. 70–72), loco-disease (pp. 74–89), the life history of *Trypanosoma equiperdum* (pp. 90–92), and a contribution on sarcosporidiosis with special reference to its associations with loco-disease and dourine, and the possibility of mistaking the spores of Sarcocystis for certain so-called developmental forms of trypanosomata (pp. 93–100), by E. A. Watson; redwater investigations in British Columbia (pp. 101–112), by T. Bowhill; and open air experiments with tuberculous cattle (pp. 169–188), by J. G. Rutherford.

Report of the veterinary director general and live stock commissioner, J. G. RUTHERFORD ET AL. (*Rpt. Vet. Dir. Gen. Canada, 1910, pp. 128*).—This report for the year ended March 31, 1910, includes 12 appendixes. Among the more important contributions presented are the report of the pathologist (pp. 53–57), by C. H. Higgins; a further investigation of parasites (pp. 57–59), by S. Hadwen; experimental studies of dourine (pp. 60–93), by E. A. Watson, assistant pathologist; and an account of rabies (pp. 96–103), by G. Hilton, chief veterinary inspector.

Activities of the institute of animal hygiene at Freiburg in Baden, 1909 (*Mitt. Ver. Bad. Tierärzte 10 (1910), Nos. 4, pp. 49–54; 5, pp. 65–73; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 49 (1911), No. 5, pp. 129–131*).—This extensive report deals with vaccination against hog erysipelas, mallein tests, pathoanatomical examination of material sent in for diagnosis, and discussions of the findings. During the period under report, 1,255 mouse typhoid and 1,026 rat plague cultures were sent out.

Meat and its inspection, A. R. Litteljohn (*London, 1911, pp. XII+399, figs. 33*).—A practical guide for meat inspectors, students, and health officials.

The toxic action of the products of tryptic digestion and anaphylaxis, O. Hartoch and N. Ssirenskij (*Ztschr. Immunitatsf. u. Expt. Ther., I. Orig., 7 (1910), No. 3, pp. 253–273*).—The results show that by tryptic digestion of proteins toxic bodies are formed which when injected into a guinea pig produce the classical symptoms of anaphylaxis. The toxicity of the products becomes greater the longer the tryptic digestion process is continued. According to the authors these findings seem to prove that anaphylaxis is the result of poisoning with intermediary cleavage products of proteins.

Influence of quinin and morphia upon phagocytosis, H. L. Smith (*Lancet* [*London*], *1910, II, No. 19, p. 1342; abs. in Jour. Amer. Med. Assoc., 55 (1910), No. 23, p. 2018*).—Moderate doses of quinin and morphin stimulate phagocytosis, while large amounts diminish it.

Scarlet red ointment in veterinary practice, Kösters (*Ztschr. Veterinärk., 23 (1911), No. 4, pp. 198, 199; abs. in Munchen. Tierarztl. Wchnschr., 55 (1911), No. 29, p. 489*) —Large and small wound areas which were treated at first with a 5 per cent and later with an 8 per cent scarlet red ointment quickly granulated. The author points out that in order to be successful with this form of treatment, which is inexpensive, it is necessary to have a clean (nonpurulent) granulating surface.

Remedies for animal parasites, W. H. Schultz (*Jour. Amer. Med. Assoc., 57 (1911), No. 14, pp. 1102–1106*).—A study of the relative efficiency and danger of thymol as compared with certain other remedies proposed for hookworm disease.

The rôle of the infective granule in certain protozoal diseases, A. Balfour (*Jour. Trop. Med. and Hyg.* [*London*], *14 (1911), No. 17, pp. 263, 264*).—"In spirochetosis and trypanosomiasis, what may be called the infective granule probably plays an important rôle. It marks a stage in the life cycle of the parasite, explains in some measure latent infections and possible relapses, and serves to clear up the obscure mechanism of relapses." It is stated that Fry has shown that both *Trypanosoma brucei* and *T. evansi* shed living granules. These become plasmodial masses out of which eventually trypanosomes are developed. The granules are thought to be of a spore nature; they are resistant and not easily stained by the Romanowsky process. (See E. S. R., 25, p. 788.)

Observations on the occurrence in the blood of various animals (chiefly monotremes and marsupials) of bodies apparently identical with Anaplasma marginale, Theiler, 1910, J. A. Gilruth, Georgina Sweet, and S. Dodd (*Parasitology, 4 (1911), No. 1, pp. 1–6, pl. 1*).—The authors, who have conducted investigations at the Veterinary Institute, Melbourne University, report the discovery of bodies, apparently identical with *A. marginale*, in the blood of the common pig and 10 species of native animals. They are inclined to the belief that, at least so far as these indigenous forms of mammals are concerned, the presence of these bodies, though possibly parasitic in nature, has no pathological significance.

Concerning Anaplasma marginale.—A contribution to the knowledge of Texas fever and "galziekte," H. SIEBER (*Berlin. Tierärztl. Wchnschr., 26 (1910), No. 50, pp. 993–998, figs. 6; abs. in Jour. Compar. Path. and Ther., 24 (1911), pp. 146, 147*).—The author, after briefly reviewing the literature on the subject, describes the course of the disease in 2 animals experimentally infected, one of which terminated fatally.

Transmission of amakebe by means of Rhipicephalus appendiculatus, the brown tick, A. THEILER (*Proc. Roy. Soc. London, Ser. B, 84 (1911), No. B. 569, pp. 112–115*).—The author finds that amakebe of Uganda is identical with East Coast fever of South Africa and that it is transmitted by *R. appendiculatus*, which is common in Uganda.

The capybara as a reservoir for the virus of mal de caderas, L. E. MIGONE (*Bul. Soc. Path. Exot., 3 (1910), No. 8, pp. 524, 525; abs. in Sleeping Sickness Bur. [London] Bul., 2 (1910), No. 22, p. 413*).—In Paraguay epidemics of mal de caderas in horses are frequently preceded by an excessive mortality of the carpincho, or capybara (*Hydrochœrus capibara*), a large rodent which frequents the water. In a previous account, Elmassian and the author reported an epidemic among dogs that had hunted and eaten capybaras (E. S. R., 16, p. 716). In an investigation conducted by the author during the course of an epizootic among capybaras in April, 1910, in which paralysis of the hindquarters was the predominant symptom, trypanosomes were found in their blood for the first time. Monkeys (*Nictipithecus felinus*) injected with blood from capybaras showed trypanosomes on the fifth day and died on the seventeenth day with the same symptoms as observed in the capybaras. The manner of conveyance of the infection from capybaras to horses was not determined.

Hematological studies of dogs experimentally infected with surra, A. LANFRANCHI (*Clin. Vet. [Milan], Sez. Sci., 33 (1910), No. 4–6, pp. 218–240; abs. in Sleeping Sickness Bur. [London] Bul., 2 (1910), No. 21, pp. 376, 377*).—Studies of the blood of dogs experimentally infected with *Trypanosoma evansi* are reported. A bibliography of 23 titles is appended to the account.

On the occurrence of an intracellular stage in the development of Trypanosoma lewisi in the rat flea, E. A. MINCHIN and J. D. THOMSON (*Brit. Med. Jour., 1911, No. 2642, pp. 361–364*).—A preliminary note, in which the authors report having found that in the early phases of the developmental cycle the rat trypanosome penetrates into the cells of the epithelium lining of the stomach (midgut) of the flea, and there goes through a process of multiplication.

The coyote as a host of Multiceps multiceps, M. C. HALL (*Abs. in Science, n. ser., 33 (1911), No. 860, pp. 975, 976*).—In order to determine whether the coyote carries the adult gid tapeworm, the larval *M. multiceps* obtained from the brain of a giddy sheep was fed on April 4, 1911, to 2 coyotes, each animal receiving about one-half of the cyst.

"One coyote was found dead the morning of April 10. Post-mortem examination showed death to be due to septicemia. The entire length of the small intestine showed severe ecchymotic hemorrhage. Fifty-two heads of *M. multiceps* were recovered from the intestinal contents. A comparison of these worms after 6 days' development with some recovered from a dog after 10 days' development shows the worms had established themselves and were developing normally. They were still very small but there is no reason to suppose that they would not have developed to maturity if the coyote had lived.

"The coyotes, *Canis nebracensis*, . . . were obtained in northern Montana in the area where gid is enzootic and the coyote, therefore, must be considered, in view of the experimental findings, as sharing with the dog the responsibility for carrying the gid parasite and maintaining the gid disease in that State."

A third case of *M. serialis* in the squirrel is also noted, the author having produced the larval *M. serialis* in an American squirrel, *Sciurus carolinensis*, by feeding proglottides of the adult worm from the dog.

The diagnosis of anthrax with the precipitation method, W. PFEILER (*Berlin. Tierärztl. Wchnschr., 27 (1911),No. 13, pp. 217, 218*).—The author was able to confirm Bierbaum's conclusions (E. S. R., 25, p. 782) that anthrax can be diagnosed in putrefied material with the precipitation reaction.

Investigations in regard to the bacteriological detection of the anthrax bacillus in cadavers and parts of cadavers, H. FOTH and WULFF (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), No. 1, pp. 15–38*).—None of the well-known methods for detecting anthrax bacilli, according to the authors, can be absolutely relied upon for detecting anthrax in dead animals if the examination is not begun very soon after death.

The bacterioscopic test with blood preparations is the best. Gypsum rods when prepared according to various methods yield differing results. (See also above.)

The diagnosis of symptomatic anthrax, II, H. FOTH (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 8 (1910), No. 2–3, pp. 117–139, pls. 7*).—Continuing previous work (E. S. R., 23, p. 584) the author points out that symptomatic anthrax is a septicemia, and furthermore that the causative organisms may be distributed throughout the entire animal body. The bacilli can usually be detected by bacteriological methods, but if the cases are recent it may be necessary to use enriching methods. In this connection the author points out that in some instances in animals dying from other diseases a bacillus is often present which simulates the causative organism of symptomatic anthrax. The morphological and biological characteristics of the organism are given in detail.

[Report on anthrax], C. PONDER (*A Report to the Worshipful Company of Leathersellers. London, 1911, pp. VI+88, fig. 1, dgms. 3*).—This is a detailed report in regard to anthrax, and of inquiry into certain measures aiming at its prevention.

Among the topics reported are anthrax in animals, the collection, curing, and shipment of hides and skins, anthrax and the tannery, the incidence of anthrax among those engaged in the hide, skin, and leather industries, and the prevention of industrial anthrax. Appendixes deal with the preparation of test materials containing anthrax spores, the reaction of calcium hydroxid (the liming process) on anthrax spores, and the Seymour-Jones formic-mercury process.

Strangles, A. G. TODD (*Jour. Compar. Path. and Ther., 23 (1910), No. 3, pp. 212–229, dgm. 1; abs. in Centbl. Bakt. [etc.], 1. Abt., Ref., 49 (1911), No. 5, p. 131*).—The author discusses the pathology, symptoms, preventive measures, and immunizing tests conducted up to the present time, and in connection with these he reports the results obtained by himself with a vaccine which he terms Strangline.

The vaccine used was prepared from streptococci isolated from cases of strangles, and which were passed through a mouse and cultivated further on blood serum. The cultures so obtained were then propagated for one month in flasks containing 500 cc. of 10 per cent serum-bouillon at 37° C. After this time had elapsed, 6 per cent of glycerin was added to the culture and the flask kept for 2 days over unslaked lime at 60°. This process killed the streptococci and congealed the contents of the flask. To the congealed mass sterile water containing 0.5 per cent of carbolic acid was added to bring the bouillon back to one-half of the original volume. The vaccine thus prepared was given subcutaneously in doses of from 1 to 10 cc.; the results obtained were considered good.

Treatment of tetanus during the period of contraction, J. CAMUS (*Compt. Rend. Soc. Biol.* [*Paris*], *68* (*1910*), *No. 10, pp. 460–463; abs. in Zentbl. Biochem. u. Biophys., 10* (*1910*), *No. 4, p. 187*).—Dogs were injected with tetanus toxin and divided into three groups. One group received tetanus antitoxin and guinea pig brain emulsion, a second tetanus antitoxin alone, and the third brain emulsion alone in the spinal fluid. Those receiving tetanus antitoxin plus brain emulsion recovered but the other two groups did not.

Final report of the royal commission appointed to inquire into the relations of human and animal tuberculosis (*Roy. Com. Tuberculosis, Final Rpt., 1911, pt. 1, pp. IV+54*).—The original questions propounded to the commission were the following: "(1) Whether the disease in animals and man is one and the same; (2) whether animals and man can be reciprocally infected with it; (3) under what conditions, if at all, the transmission of the disease from animals to man takes place, and what are the circumstances favorable or unfavorable to such transmission." The animals used in the investigations were cattle, rabbits, guinea pigs, goats. chimpanzees, monkeys, horses, cats, mice, rats, dogs, and birds. The bacilli used for the infection and cultural tests were obtained from the lesions of the natural disease.

In regard to the first question the commission points out that the human and bovine type of bacilli are morphologically indistinguishable, but are somewhat different in regard to their cultural characteristics and their capacity for producing the disease in various species of animals, so that the diagnosis "clearly depends upon the importance which it is permissible to attach to their cultural and pathogenic differences, and this in turn on the fixity or variability of the differences in question." The human type of bacillus was found to produce a fatal tuberculosis in guinea pigs, chimpanzees, and monkeys, but caused only slight and nonprogressive lesions in cattle, goats, and pigs. Guinea pigs, monkeys, and chimpanzees were also highly susceptible to the bovine type of bacillus, but the type of disease produced by this bacillus was anatomically and histologically identical with that produced by the human type of bacillus. Experiments with the bovine type of bacillus in man were not conducted, but comparisons with cases probably caused by the bovine type of bacillus were made. "Except for the difference in the type of bacillus found in the 2 groups of cases presented [the cases themselves had] similar features; the clinical histories of the patients were alike, the cases all terminated fatally, and the lesions examined after death were found to be anatomically indistinguishable. Man must therefore be added to the list of animals notably susceptible to bovine tubercle bacilli." Attempts to transmute the bovine type into the human type, or vice versa, in most instances failed, from which the commission concludes that it is a very difficult thing to produce such transmutations under ordinary laboratory conditions. There is, however, "an aspect in which tuberculosis in men and in cattle must unquestionably be pronounced one and the same disease. Whether one prefers to regard bovine tuberculosis and the cases of tuberculosis in man which are caused by the human type of bacilli as varieties of the same disease or as independent diseases, there can be no question that human tuberculosis is in part identical with bovine tuberculosis." No conclusion was drawn in regard to whether avian tuberculosis, when compared with either human or bovine tuberculosis (as caused by their respective bacilli) is the same disease.

The second question propounded above is answered in the affirmative (although in no instance was the human type of tubercle bacillus isolated from cattle suffering from natural tuberculosis) as follows: "Mammals and man can be reciprocally infected with the disease (tuberculosis)," but whether reciprocity with the fowl and other birds exists must for the present remain unanswered. Mammals generally, with the exception of the rabbit and mouse, were not susceptible to infection with the avian type of bacillus. In addition to this it is pointed out that "bovine animals are not completely immune to the human tubercle bacillus, and adult human beings can be infected with the bovine type, even the pulmonary form of the disease in man being sometimes caused by the bovine tubercle bacillus."

In regard to question 3, the commission concludes "that the evidence accumulated goes to demonstrate that a considerable amount of the tuberculosis of childhood is to be ascribed to infection with bacilli of the bovine type transmitted to children in meals consisting largely of the milk of the cow."

For previous interim reports see earlier notes (E. S. R., 19, p. 181; 21, p. 481).

The tuberculo-opsonic index in man and bovine, Strubell and Felber (*Centbl. Bakt.* [*etc.*], *1. Abt., Orig., 54 (1910), No. 1, pp. 44–73; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 11, p. 566*).—The results of 805 determinations with 50 tuberculous subjects show that 38 per cent gave a normal index (between 0.9 and 1.1), 33 per cent were below normal, and the remainder above normal. With healthy bovines the values in 98 per cent of the cases were normal with the human tubercle bacillus, and in 71 per cent of the cases with the bovine type, with 21 per cent of the bovine type above normal. With tuberculous bovines the values with the human type were normal for 83 per cent, and with the bovine type for 58 per cent, with 34 per cent of the bovine type above normal. The active sera of bovines artificially infected with the human tubercle bacillus had normal values in 51 per cent of the cases for the human type bacillus, and in 45 per cent for the bovine type bacillus. With the human type 46 per cent of the values were below normal, and for the bovine type 52 per cent.

In regard to renal tuberculosis in the bovine as an open condition, Kallina (*Ist die Nierentuberkulose des Rindes zur "offenen tuberkulose" zu rechnen? Inaug. Diss., Univ. Giessen, 1910, pp. 40, pl. 1; Arch. Wiss. u. Prakt. Tierheilk., 36 (1910), No. 2, pp. 137–176, pl. 1; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 8, pp. 406, 407*).—On the basis of his work the author puts renal tuberculosis of bovines in the category of open tubercular processes.

About anaphylaxis in tuberculosis, C. Vallardi (*Ztschr. Immunitätsf. u. Expt. Ther., I. Orig., 7 (1910), No. 3, pp. 381–388*).—Proceeding according to the methods utilized by other workers, typical anaphylactic symptoms could not be noted. Objective symptoms such as a fall in temperature and the lowering of complement were also absent.

Action of ovarian substance upon tubercle bacilli, H. Wittgenstein (*Wiener Klin. Wchnschr., 22 (1909), No. 51, pp. 1785–1788, figs. 2; abs. in Centbl. Bakt.* [*etc.*], *1. Abt., Ref., 46 (1910), No. 13–14, pp. 398, 399*).—Tubercle bacilli which were kept in ovarian extracts for from 15 to 20 days lost much of their virulence.

About tuberculosis immunity—Immunity in active tuberculosis, R. Kraus and R. Volk (*Wiener Klin. Wchnschr., 23 (1910), No. 19, pp. 699–701; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4 (1910), No. 11, p. 563*).—The results show that resolved or healed tuberculosis leaves no immunity behind, and therefore indicate that no immunity can be expected by vaccinating with virulent bacilli. Furthermore, it is apparent that it is not possible to immunize a normal subject against tuberculosis. Tubercular subjects are the only ones which can be immunized.

Immunizing against tuberculosis in guinea pigs, G. Deycke and H. Much (*Beitr. Klinik Tuberkulose, 15* (*1910*), *No. 2, pp. 277–302; abs. in Internat. Centbl. Gesam. Tuberkulose Forsch., 4* (*1910*), *No. 12, p. 628*).—The author was able by means of dissolved tubercle bacilli and lecithin to immunize against a following infection with tubercle bacilli.

Open-air experiments with tuberculous cattle, J. G. Rutherford (*Rpt. Vet. Dir. Gen. Canada, 1909, pp. 169–188*).—Previously noted from another source (E. S. R., 25 p. 184).

Control of bovine tuberculosis in British Columbia, M. A. Jull, A. Knight, and H. H. S. George (*Brit. Columbia Dept. Agr., Live Stock Dept. Bul. 32, 1911, pp. 52, figs. 5*).—The first part of this bulletin contains the report of the International Commission on the Control of Bovine Tuberculosis, which has been previously noted (E. S. R., 25, p. 384). Part 2 deals with bovine tuberculosis in British Columbia and its eradication, and is illustrated by photographs of diseased animals and pathological preparations made therefrom. The text of the contagious diseases (animals) act is also given.

Scabies (mange) in cattle, E. L. Moore (*South Dakota Sta. Bul. 131, pp. 203–214, figs. 3*).—A popular account describing the symptoms, diagnosis, and treatment.

A note on the occurrence of pentastomes in Australian cattle, T. H. Johnston and J. B. Cleland (*Jour. and Proc. Roy. Soc. N. S. Wales, 44* (*1910*), *pt. 3, pp. 315–318*).—The authors record the occurrence of a larval pentastome (*Pentastomum denticulatum*), the adult of which is known as *Linguatula serrata*, in the mesenteric glands of Illawarra cattle suffering from endemic hematuria at Berry, New South Wales. This is said to be the first record of its occurrence in Australia.

Endemic hematuria ("Illawarra redwater") in cattle, due to angiomata in the bladder: Its possible relation to pentastomiasis, J. B. Cleland (*Jour. Trop. Vet. Sci., 6* (*1911*), *No. 2, pp. 125–133, pls. 2*).—"Endemic hematuria (Illawarra redwater) is a distinct entity. It is common in the coastal districts of New South Wales. Evidently the same disease existed near Mt. Gambier in South Australia in 1894. Occasional cases occur in Victoria and probably it is the same disease that exists in Fiji and other Pacific Sea islands. It is characterized by hematuria of vesical origin, due to the bleeding from small angiomatous tumors in the bladder. The condition, as evidenced by the frequent presence of small papillomata and rarely, in long standing cases, by the appearance of carcinoma, is due to some form of chronic irritation. Larval pentastomes, living or calcified, have been found in considerable numbers in the mesenteric glands of all cases examined. They have also been found, but less frequently and usually in smaller numbers, in unaffected animals from the same and other districts. It is possible that the bladder lesions may be caused by the escape of these parasites through the bladder. This is the most probable etiological cause that has so far presented itself to careful investigation. The larval pentastomes have not so far been detected in the bladder."

An experiment in fumigation of ticks, C. W. Howard (*Parasitology, 4* (*1911*), *No. 2, pp. 164–167*).—The experiments here reported were conducted in order to determine whether ships bringing cattle from Madagascar to Portuguese East Africa could be cleaned of the ticks which might have dropped from the cattle and thus be used in the transport of clean cattle for breeding purposes.

On March 6, 6 species of ticks in different stages, including eggs, unengorged larvæ, unengorged nymphs, unengorged and engorged females, and males of

Margaropus decoloratus, eggs, unengorged nymphs, unengorged and engorged females, and males of *Amblyomma hebræum*, unengorged females and males of *Rhipicephalus appendiculatus*, and unengorged and engorged females and males of *R. evertsi*, *R. simus*, and *Ornithodoros moubata* were placed in a bale of hay, a box of sawdust, wrapped in 3 sheets of brown wrapping paper and placed inside a shoe box, and in a jar wrapped in cotton wool. All were then exposed for 12 hours to an atmosphere of 15 per cent Clayton gas (SO_2). On March 23, after several examinations, it was found that every tick had been killed.

This and other experiments led the author to conclude that "the Clayton gas (SO_2) is effective in killing ticks in the holds of cattle ships, when closed tightly, and is able to penetrate fairly dense substances. While, however, it is effective in destroying or preventing movement of live ticks, it is not absolutely effective in destroying entirely the vitality of engorged female ticks, so that an occasional one may survive to lay eggs, a portion of which may hatch. The system is therefore effective in cleaning ships from diseases which are transmitted from one stage of the ticks to the other, but where the disease can be transmitted through the eggs it is not entirely effective."

The manner in which the ox warble (Hypoderma bovis) enters the host, M. Stür (*Hyg. Viande et Lait, 5 (1911), No. 7, pp. 393–397; Jour. Meat and Milk Hyg., 1 (1911), No. 7, pp. 397–400*).—The author, who is veterinary inspector for the Board of Agriculture of Denmark, has reported in a previous article "that penetration of the larva takes place through the œsophagus as well as through the skin, and also, in the majority of cases, that the larvæ which penetrate through the skin develop, whilst those which penetrate through the œsophagus die."

In this article he records further observations (made in the lumbar region) of the entire length of canals containing the larvæ, which he thinks furnish proof that the canals start at the surface of the skin and that the penetration of the larvæ takes place thereby.

Worm nests in Australian cattle due to Filaria (Onchocerca) gibsoni, with notes on similar structures in camels, J. B. Cleland and T. H. Johnston (*Jour. and Proc. Roy. Soc. N. S. Wales, 44 (1910), pts. 1, pp. 156–160; 2, pp. 161–171*).—In this paper the authors deal with the historical and pathological sides of the subject. See also previous notes (E. S. R., 24, p. 785).

On the anatomy and possible mode of transmission of Filaria (Onchocerca) gibsoni, T. H. Johnston and J. B. Cleland (*Jour. and Proc. Roy. Soc., N. S. Wales, 44 (1910), pt. 2, pp. 171–189, pl. 1*).—A continuation of the account above noted.

The nasal fly of sheep (Œstrus ovis) in Australia, W. W. Froggatt (*Agr. Gaz. N. S. Wales, 22 (1911), No. 3, pp. 223–227, pl. 1*).—The author states that an increased number of complaints of parasitism of sheep by this fly are being received.

Hog-cholera serum, E. A. Burnett (*Nebraska Sta. Rpt. 1910, pp. XVII, XVIII*).—It is stated that 14,000 minimum doses of hog-cholera serum had been produced, prior to the date of writing, which had been used in part on 8,800 hogs, averaging in weight 130 lbs., with a loss of less than 7 per cent. These hogs represented 116 different outbreaks in 39 counties. It is estimated that for the $5,000 invested for serum, there will have been a direct saving of $75,000 in addition to the indirect saving in stopping outbreaks early and preventing further spread. It is further stated that, based on estimated prices, the cost of producing a dose of serum was about 5 per cent of the value of the hog.

The ascarid in the horse and its removal with tartar emetic, Grimme (*Deut. Tierärztl. Wchnschr., 19 (1911), No. 16, pp. 247–249; abs. in München.*

Tierärztl. Wchnschr., *55* (*1911*), *No. 29*, *pp. 489*, *490*).—The most effective remedy for the removal of *Ascaris megalocephala* from the horse, according to the author, consists of giving from 15 to 20 gm. of tartar emetic in fractionated doses as follows: The tartar emetic is dissolved in a bucketful of water and one-third of it is given at 6 o'clock in the morning (water being withheld from the animals since the night previous), the second third at 8 o'clock, and the last at 8.30. After this treatment cathartics are usually unnecessary, but feeding beets or bran may aid the process considerably.

A contribution to the knowledge of the occurrence and development of Sclerostomum edentatum, O. MARTIN (*Arch. Wiss. u. Prakt. Tierheilk.*, *37* (*1910*), *No. 1–2*, *pp. 106–151*, *pl. 1*, *figs. 2*).—Following a brief review of the literature, the author reports upon investigations of the biology of *S. edentatum*, its infestation of equines of different ages, etc.

Of 426 horses examined in the course of a year at the Hamburg abattoir 214 were found to be infested by this nematode. In these horses the worms were found in the subserosa of the parietal peritoneum in 139 cases and in the large intestine in 180. They were found both in the intestine and beneath the parietal peritoneum in 105, beneath the parietal peritoneum alone in 34, and in the intestine alone in 75 cases. Of 495 additional horses in which only the subserous tissue of the parietal peritoneum was examined 162 were infested.

A bibliography of 41 titles is included.

Notes on ovarian infection with Bacterium pullorum (Rettger) in the domestic fowl, G. E. GAGE (*Jour. Med. Research*, *24* (*1911*), *No. 3*, *pp. 491–496*).—*B. pullorum* was isolated from the ovaries of 3 domestic fowls and in some instances in pure culture.

From one of the cases 12 ova were used for preparing agar and bouillon cultures, which were tested as regards virulency as follows: "Eighty-two chicks which had been incubated under proper conditions were used for this test. Sixty-two were inoculated, 30 by subcutaneous injections of a small amount of a bouillon culture of *Bacterium pullorum*, and 32 received 2 drops of a bouillon culture of the organism by the mouth. These inoculations were made at the end of 24 and 48 hours respectively. The remaining 20 healthy chicks were kept under the same conditions as the inoculated chicks. Every chick in the check lot was alive and healthy at the end of 6 weeks when this test was considered concluded," while 60 of the 62 infected birds died.

A post-mortem examination of each chick was made, and according to the author the results obtained corresponded well with Rettger and Stoneburn's pathological findings (E. S. R., 25, p. 590). He believes that there can be no doubt that *B. pullorum* is the causative agent for white diarrhea in chicks. The organism was reisolated in each instance.

About transferable fowl leukemia, H. HIRSCHFELD and M. JACOBY (*Berlin. Klin. Wchnschr.*, *46* (*1909*), *No. 4*, *pp. 159*, *160*; *abs. in Zentbl. Gesam. Physiol u. Path. Stoffwechsels*, *n. ser.*, *5* (*1910*), *No. 9*, *pp. 356*, *357*).—The results of tests with 2 diseased fowls which presented the typical leukemic symptoms are reported. The blood from these animals was transferred through 4 generations, and in each instance the blood of the inoculated animal showed the typical picture of leukemia and contained tubercle bacilli. It is concluded that even tubercle bacilli can bring about an enormous increase in certain leucocytes in the blood which reminds one of leukemia.

In regard to an epizootic of an unknown chicken disease, M. EGGEBRECHT (*Ztschr. Infektionskrank. u. Hyg. Haustiere*, *5* (*1909*), *No. 5*, *pp. 453–458*; *abs. in Berlin. Tierärztl. Wchnschr.*, *26* (*1910*), *No. 5*, *p. 116*).—Along with chicken cholera there occurs yearly in Tsingchau, China, an acute febrile disease which causes a large mortality among chickens. It is caused by an ultravisible filterable virus which accumulates in the blood, organs, and in the secretions and excretions. Experimental tests showed the incubation period to be a very short one and that death occurred in 2 to 3 days. Geese, ducks, rabbits, and mice could not be infected, while pigeons could be infected occasionally. The author believes the disease to be pestis gallinarum (fowl plague).

The filaria (Oxyspirura mansoni) of the conjunctival sac of fowls, H. Fujita (*Abs. in Rev. Gén. Méd. Vét., 17 (1911), No. 204, pp. 707, 708*).—The author reports that the fowls of Formosa nearly always harbor this filaria in abundance in the conjunctival sac.

On Australian avian entozoa, T. H. Johnston (*Jour. and Proc. Roy. Soc. N. S. Wales, 44 (1910), pt. 1, pp. 84–122*).—The author has here brought together under each host a list of the endoparasites recorded as occurring in birds in Australia, as well as the references to their occurrence.

RURAL ENGINEERING.

Irrigation under the Carey Act, A. P. Stover (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1910, pp. 461–488, pls. 2*).—The text of the Carey Act and its subsequent amendments is given, together with a discussion of the causes which led up to the adoption of the act and the several amendments; an account of the operation of the law in the 8 States and Territories which have accepted its provisions; lists of irrigation companies operating under the Carey Act, showing acreage, estimated cost of systems, and maximum price of water per acre; and other data. A table summarizing the development accomplished under the provisions of the act follows:

Development accomplished in the West under the provisions of the Carey Act.

State.	Number of projects.	Area granted by United States.	Area segregated and segregations pending.	Additional area temporarily withdrawn from entry.	Area entered by settlers and being developed.
		Acres.	*Acres.*	*Acres.*	*Acres.*
Idaho	42	3,000,000	2,630,833	....	713,890
Wyoming	63	2,000,000	1,380,402	9,663	130,004
Oregon	16	1,000,000	382,528	210,596	54,000
Montana	13	1,000,000	411,328	....	45,000
Colorado	20	[1] 1,000,000	1,121,940	....	34,000
Nevada	13	1,000,000	60,252	112,963	....
New Mexico	....	1,000,000	16,000	....	....
Total	167	10,000,000	6,003,281	333,222	976,894

[1] Exclusive of Ute Indian Reservation.

Irrigation and agricultural practice in Arizona, R. H. Forbes (*Arizona Sta. Bul. 63, pp. 83, pls. 8, figs. 8*).—This is a reprint of Bulletin 235 of this Office, previously noted (E. S. R., 25, p. 488). It also includes supplementary data showing the area irrigated in 1909 (306,665 acres), the assessed value of property in 1911, and the value of live stock on farms and ranges.

Development of methods of draining irrigated lands, C. G. Elliott (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1910, pp. 489–501, pls. 4, figs. 2*).—This article discusses causes which produce seepage in irrigated lands and methods of drainage applicable to the arid regions. Methods in use in the Bear River Valley, Utah, western Colorado, and elsewhere are described, together with data on the use of collecting pits and sand traps, special relief wells and discharge drains, steam land dredges, cement drain tile and wooden box drains, the pumping of drainage waters from sumps into irrigation ditches, and cooperative drainage projects.

It is pointed out that drainage practice in irrigated regions differs materially from ordinary practice in the humid sections. Under the usual conditions in irrigated fields 6 ft. is found to be about the minimum depth advisable. The frequent use of a few well located and deep drains to intercept the underflow before it reaches the land which requires drainage is another striking difference. The method of draining by relief wells, an adaptation of the Elkington system of tapping underground springs, is emphasized as especially applicable to the improvement of saturated irrigated lands.

It is estimated that there are at least 800,000 acres of irrigated land which now require drainage to make them profitably productive.

Tidal marshes and their reclamation, G. M. WARREN (*U. S. Dept. Agr., Office Expt. Stas. Bul. 240, pp. 99, pls. 16, figs. 21*).—This bulletin reports special investigations of two reclamations in New Castle County, Del., and two in Cumberland County, N. J. These reclamations have been carefully surveyed, current-meter measurements made of the sluice discharges, and the results studied in considerable detail from agricultural, engineering, and economic standpoints. The forepart of the report contains a definition of terms and a short discussion of tides. Following detailed descriptions of the experimental marshes a general summary and discussion covers the proper character, construction, and maintenance of sluices, levees, ditches, and pumping plants, soils, ground-water vegetation and its relation to the water-table, treatment of lands and crops grown, and financial and sanitary aspects. There are also brought out the reasons for poor progress and causes of failure in so many of the tidal reclamations of the past, and the questions which should be decided before any reclamation is undertaken are discussed.

Supplemental investigations are reported of the marsh lands at Green Harbor, Mass., and others in New England, New Brunswick, and Nova Scotia. A rather complete history of the first-mentioned reclamation is given in order to bring out the legal aspects of the questions often involved in attempted reclamations.

In conclusion, the author explains the success of tidal reclamations on the Bay of Fundy, and the apparent indifferent success which has attended many of the reclamations farther south along the Atlantic Coast, as follows: "Unquestionably the fundamental reason lies in the great nature-bestowed gift of a large range of tide, which has built the marshes high and permits the sluices to play long periods of time, thus securing adequate drainage easily, cheaply, and certainly. There are, of course, other reasons of historical, physical, and economic nature which have contributed, but they are relatively insignificant and are more than offset by our own economic needs and by American energy, enterprise, and resourcefulness."

Dynamite for preparing land, J. T. GARRETT (*New England Homestead, 63 (1911), No. 15, p. 318*).—In giving his experience with the use of dynamite for subsoiling for corn, the author states that rows were marked 15 ft. wide and plowed out with a 1-horse turning plow. With a 1½ in. steel bar holes were made in this furrow 40 in. apart and 30 in. deep into the subsoil and through hardpan, loaded with one-half of a ½ lb. stick of dynamite, and several holes fired at one time. A yield of 120 bu. of corn per acre was obtained. An adjoining area of the same size subsoiled with a plow and mules produced 82 bu. per acre.

The author also states his experience with dynamite in growing melons. He expects beneficial results from this dynamiting for at least 10 years.

Examination and classification of rocks for road building, including the physical properties of rocks with reference to their mineral composition and structure, E. C. E. LORD (*U. S. Dept. Agr., Office Pub. Roads Bul. 37, pp. 28, pls. 10, fig. 1*).—This is a revision of Bulletin 31 of the Office of Public

Roads (E. S. R., 19, p. 385), which it supersedes, and describes methods of petrographic examination and classification of rocks used in road making with other "facts of importance bearing on the relation of the physical properties of rocks to their mineral composition and structure."

Highway bridges and culverts, C. H. Hoyt and W. H. Burr (*U. S. Dept. Agr., Office Pub. Roads Bul. 39, pp. 22, pls. 14, figs. 3*).—This bulletin presents a general discussion of the status of highway bridge and culvert construction, summarizing data as to previous methods, and making suggestions as to methods now in vogue and the assistance being rendered in such construction by the Office of Public Roads of this Department.

"The relation of culverts and bridges to the general movement for the improvement of our public highways is intimate. The desirability and economy of building these structures of durable and permanent material, or according to intelligent or economic design, has not thus far been actually recognized in practice throughout the United States. The expensive and unsatisfactory method of repairing the old and inadequate structures of the past or of fording the streams is still continued. Modern traffic now demands that the construction of bridges and culverts shall keep pace with industrial development."

Descriptive catalogue of the road model exhibit (*U. S. Dept. Agr., Office Pub. Roads Bul. 36, pp. 20, pls. 14, fig. 1*).—This bulletin embodies data originally compiled for use in explaining the exhibit of the Office of Public Roads at the Alaska-Yukon-Pacific Exposition. It describes in detail the models used to illustrate the construction of road foundations, earth, sand, clay, gravel, macadam, and brick roads, and presents data as to road machinery.

The use of concrete on the farm (*U. S. Dept. Agr., Farmers' Bul. 461, pp. 23, figs. 10*).—In this publication, which supersedes Farmers' Bulletin 235, previously noted (E. S. R., 17, p. 709), suggestions for mixing and handling concrete under farm conditions are presented. Data are given on the selection of materials and the manufacture of concrete, the use of measuring boxes and other equipment for mixing concrete, and the construction and use of forms.

Silo construction, A. S. Kenyon (*Jour. Dept. Agr. Victoria, 9 (1911), Nos. 7, pp. 492-503; 8, pp. 566-573, figs. 9*).—Details are given for building steel, cement, wood, and wood and iron silos.

Reinforced brick silos, R. T. Archer (*Jour. Dept. Agr. Victoria, 9 (1911), No. 8, pp. 574-576, figs. 2*).—Details are given for the construction of an economical type of brick silo, reinforced with galvanized wire.

The plastered or Gurler silo, H. E. McNatt (*Missouri Sta. Circ. 48, pp. 107-114, figs. 9*).—Directions are given for building the plastered or Gurler silo.

The reinforced concrete silo, F. H. Demaree (*Missouri Sta. Circ. 49, pp. 115-122, figs. 4*).—Directions are given for constructing a reinforced concrete silo. A reinforced stone silo in use on the college farm at Columbia, Mo., is illustrated and briefly described.

Poultry house construction, D. O. Barto (*Farmers Voice, 49 (1911), No. 114, pp. 3, 13, fig. 1*).—A discussion of poultry house construction. An open-front, "half-monitor" type of poultry house constructed of hollow cement blocks, recently built at the Illinois Station, is illustrated and described.

[Design for farm buildings on small holdings] (*Country Life [London], 30 (1911), No. 756, pp. 11*, 12*, fig. 9*).—This plan for a cottage, barn, and outbuildings for an English holding of about 50 acres received the first prize in the competition of the recent show of the Royal Agricultural Society of England.

The sanitary privy, C W. Stiles and L. L. Lumsden (*U. S. Dept. Agr., Farmers' Bul. 463, pp. 32, figs. 9*).—Soil pollution and the diseases spread from man to man in this way are discussed, the various kinds of privies described, and detailed directions presented for building a sanitary privy and keeping it in proper condition.

The L. R. S. privy, an apparatus devised by Lumsden, Roberts, and Stiles[a] consists of the following parts: "(1) A water-tight barrel or other container to receive and liquefy the excreta.

"(2) A covered water-tight barrel, can, or other vessel to receive the effluent or outflow.

"(3) A connecting pipe about 2½ in. in diameter, about 12 in. long, and provided with an open T at one end, both openings of the T being covered with wire screens.

"(4) A tight box, preferably zinc lined, which fits tightly on the top of the liquefying barrel. It is provided with an opening on top for the seat, which has an automatically closing lid.

"(5) An antisplashing device consisting of a small board placed horizontally under the seat about an inch below the level of the transverse connecting pipe; it is held in place by a rod, which passes through eyes or rings fastened to the box, and by which the board is raised and lowered. The liquefying tank is filled with water up to the point where it begins to trickle into the effluent tank.

"As an insect repellent a thin film of some form of petroleum may be poured on the surface of the liquid in each barrel."

This device is believed to eliminate the fly and mosquito problem, liquefies fecal material, reduces odor and the labor of cleaning, and is of simple and inexpensive construction.

Water power for the farm and country home, D. R. Cooper (*New York: State Water Supply Com., 1911, pp. 45, figs. 30*).—The installation of power-driven machinery and its advantages are discussed, as well as the development of electric power from water power and related questions.

RURAL ECONOMICS.

General agricultural data for the United States (*U. S. Dept. Com. and Labor, Bur. Census* [*Press Bul.*], *1911, Sept. 7, folio*).—This is an advance statement from the Thirteenth Census containing general agricultural data for the United States, collected as of April 15, 1910.

It is shown that the increase in the number of farms has not kept pace with the increase in population, the number of farms having increased 10.5 per cent, while the total population shows an increase of 21 per cent. A decrease is reported in the average size of farms from 146 acres in 1900 to 138 acres in 1910, but the improved land has increased from 414,499,000 acres in 1900 to 477,448,000 acres in 1910, a gain of 15.2 per cent. The average value of farm property is shown to have increased from $15.57 per acre in 1900 to $32.49 per acre in 1910, an increase of 108.7 per cent.

The factors mentioned as contributing to the increased value of farm land include the advanced farm prices of agricultural products; capitalizing the income-producing power at a lower rate of interest than formerly; the cost of improving what was previously unimproved land; the depletion of desirable free land resulting in an increase in the number of buyers; an increased demand for homes in the open country; and the expenditure of much labor and money on various kinds of improvements, such as the building of roads, bridges, schoolhouses, and other rural improvements.

The following table shows more detailed data as to general agricultural operations:

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[a] Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 25 (1910), pp. 1619–1623.

Agricultural statistics for United States, 1900 and 1910.[a]

	1910.	1900.	Increase, 1900-1910.	
			Number or amount.	Per cent.
Total number of farms	6,340,357	5,737,372	602,985	10.5
Total acreage	873,729,000	838,592,000	35,137,000	4.2
Per cent of improved acreage	55	49	....	....
Value of land and buildings	$34,681,507,000.00	$16,614,648,000.00	$18,066,859,000.00	108.7
Value of land	28,386,770,000.00	13,058,008,000.00	15,328,762,000.00	117.4
Value of buildings	6,294,737,000.00	3,556,640,000.00	2,738,097,000.00	77.0
Value of implements and machinery	1,262,022,000.00	749,776,000.00	512,246,000.00	68.3
Average value per acre of land and buildings	39.69	19.81	19.88	100.4
Average value per acre of land alone	32.49	15.57	16.92	108.7
Total expenditures for labor	645,612,000.00	357,392,000.00	288,220,000.00	80.6
Total expenditures for fertilizer	114,277,000.00	53,432,000.00	60,845,000.00	113.9
Number of white farmers	5,422,892	4,969,608	453,284	9.1
Number of negro and other nonwhite farmers	917,465	767,764	149,701	19.5
Number of farm owners	3,933,705	3,653,323	280,382	7.7
Number owned free	2,622,341	....	....	....
Number mortgaged	1,311,364	....	....	....
Number of tenants	2,349,254	2,024,964	324,290	16.0
Number of managers	57,398	59,085	−1,687	−2.9
Farms 19 acres and under	829,303	673,870	155,433	23.1
Farms 20 to 49 acres	1,410,992	1,257,496	153,496	12.2
Farms 50 to 99 acres	1,435,743	1,366,038	69,705	5.1
Farms 100 to 174 acres	1,513,235	1,422,262	90,973	6.4
Farms 175 to 499 acres	976,597	868,020	108,577	12.5
Farms 500 to 999 acres	124,883	102,526	22,357	21.8
Farms 1,000 acres and over	49,604	47,160	2,444	5.2

[a] Excluding data for Alaska, Hawaii, and Porto Rico.

Live stock on the farms of the United States (*U. S. Dept. Com. and Labor, Bur. Census* [*Press Bul.*], *1911, Oct. 30, folio*).—This report presents notes and data relative to the number, value, etc., of live stock in the United States in 1910 and 1900. The table below shows the change in numbers and value of selected classes of domestic animals during the decade:

Number and value of selected classes of domestic animals, 1910 and 1900.

Class.	1910 (April 15).		1900 (June 1).		Increase.			
					Amount.		Per cent.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
CATTLE.								
Spring calves	7,757,935	$51.599,629	15,315,582	$137.290,001	−7.557,647	−$85,690,372	−49.3	−62.4
Dairy cows	20,580,845	704,612,120	17,135.633	508,616,501	3,445,212	195,995,619	20.1	38.5
Other cattle	32,887,011	728,677.898	35,268.195	829,298,131	−2,381,184	−100,620,233	− 6.8	−12.1
HORSES.								
Spring colts	607,957	20,535,259	1,314,829	25.896,871	− 706,872	− 5,361,612	−53.8	−20.7
Other horses and colts	19,123,103	2,055,762,569	16.952,191	870,616,346	2,170.912	1,185,146,223	12.8	136.1
MULES.								
Spring colts	108,361	4,505,014	231,628	6,201,899	− 123,267	− 1,696,885	−53.2	−27.4
Other mules and colts	4,075,211	517,897,066	3,032,987	190,020,154	1,042,224	327,876,912	34.4	172.5
SHEEP.								
Spring lambs	12,622,299	28,913,461	21,650,746	42,016,328	−9,028,447	− 13,102,867	−41.7	−31.2
Other sheep and lambs	39,186,769	201,619,356	39,852,967	128,186,791	− 666,198	73,432,565	− 1.7	57.3

It is pointed out that the aggregate value of all live stock, including the common domestic animals, poultry, and bees, has increased 59.2 per cent since 1900. The value of cattle, however, has increased only 0.7 per cent, while the increase in the value of horses has been 131.6 per cent.

The total number of farms reporting poultry increased 9.6 per cent during the decade. The total number of fowls increased 18.1 per cent, and the increase in their value was 78.9 per cent, the total number of fowls being 295,876,176, and the total value $153,394,000 in 1910. Other tables are given showing the value of live stock by classes and geographic divisions in 1910 and 1900, and by farms reporting, and the number, value, and average value of domestic animals by age and sex groups in 1910.

Land values and land prices in the East and in the West, G. F. Warren (*N. Y. Dept. Agr., Rpt. Farmers' Insts., 1908-9, pp. 69-83, pls. 3*).—In this address the author points out the extreme importance of capital as a factor in determining the profits that the farmer is able to make, and expresses the opinion from a statistical study that the failure of many a good farmer is primarily due to a lack of capital to manage his business properly. He calls attention to the depreciation of land values and prices in the East as compared with those of the West, showing that land values in New York State depreciated 11 per cent from 1890 to 1900. This he attributes to the development of free land in the West, together with the prevalence of farms of too small area in the East and their nearness to cities which easily attracted boys away from them upon the slightest depreciation of business.

Tables are given contrasting the average yields and values per acre of the 5 leading crops in representative States of the 2 sections for a period of 10 years, showing that during that period the average values per acre of these 5 crops have been $19.42 in New York, $16.70 in Illinois, and $13.96 in Iowa. Other data are given contrasting the price of farm lands, the cost of pasture land, and farm crops statistics, together with their values, etc.

Farms for sale or for lease in Rhode Island (*R. I. Conserv. Com. Bul. 1, 1911, pp. 278, pls. 17, map 1*).—This bulletin, issued by the Rhode Island State Conservation Commission, presents a detailed list of farms in Rhode Island for sale or for lease, with special reference to the needs of prospective purchasers.

Survey of Alaska lands, M. D. Snodgrass (*Alaska Stas. Rpt. 1910, pp. 65-69*).—This report shows the results of a brief and cursory survey of the available agricultural land in the Tanana Valley. A greater portion of the report is based on interviews with prospectors and hunters met by the author at different landings along the river, though personal observations were made wherever practicable.

The Valley is reported to be 300 miles long and from 30 to 70 miles wide, aggregating, together with the valleys of various tributaries, about 15,000 square miles of valley land. The southern slopes of the hills in various parts of the Valley are thought to be good farming lands. The lowlands, where drainage is possible, would often produce abundantly but crops here are in greater danger of midsummer frosts.

Letters from settlers (*Alaska Stas. Rpt. 1910, pp. 69-76*).—Communications from settlers in various parts of Alaska concerning their success in gardening, cattle raising, or other agricultural enterprises, are given, especially their results with the seed distribution.

A practical farmer engaged in stock raising and general farming for several years in the coast region of southeastern Alaska calls attention to the difficulty of securing profitable farm help because of the high prices paid for labor in other industries. Large scale farming is also handicapped in that section of Alaska, because of the small areas of arable land, the expense of clearing land, and the prevalence of chickweed. Grasses are thought to offer the greatest agricultural possibilities and stock raising is considered the most promising line of farming.

Agriculture (*Statis. Jahrb. Schweiz, 19 (1910), pp. 40–64*).—Tables taken from results of the industrial census in Switzerland August, 1905, are given, showing (1) the total number of persons engaged in agriculture according to sex, class, size of farm, age, and nationality, (2) the legal relation as to ownership of farms, (3) the kind of farming as indicated by the size and extent of farms, and the number of persons engaged, (4) itinerant farm laborers, (5) the acreage devoted to different farm purposes, and (6) the utilization of machinery and other tools on farms.

Out of 763,915, the total number engaged in agriculture, 56.6 per cent were males; 14.6 per cent were over 14 and under 20 years of age; 71.7 per cent over 20 and under 60 years of age, and 13.7 per cent 60 years and over; 97.2 per cent were Swiss, and the remainder Germans, Austro-Hungarians, Italians, and French.

[Agricultural machinery, live stock, etc.] (*Statis. Jahrb. Deut. Reich, 32 (1911), pp. 31–42*).—Tables and statistics collected by the German Government showing the use of farm machinery in different kinds of agricultural work, an inventory of live stock, and data as to agricultural enterprises conducted on farms of varying sizes in the several states of Germany, are presented.

The following table shows the kind and number of implements used in the Empire on 5 sizes of farms:

Number of farm machines in use on German farms.

	Farms under 2 hectares.	Farms 2–5 hectares.	Farms 5–20 hectares.	Farms 20–100 hectares.	Farms over 100 hectares.	Total.
Number of farms	133,452	325,665	772,536	243,365	22,957	1,497,975
Steam plows	18	23	81	319	2,554	2,995
Drills and seed distributors	19,035	20,763	121,044	104,276	24,921	290,039
Mowers	1,363	6,812	137,624	136,104	19,422	301,325
Cultivators	301	1,140	4,146	6,011	2,814	14,412
Steam threshers	71,218	127,739	203,438	69,005	17,467	488,867
Other threshers	44,752	163,287	539,285	190,618	9,061	947,003
Potato planters	75	55	312	866	1,352	2,660
Potato diggers	34	93	4,196	5,442	1,239	11,004
Meat grinders	480	2,476	12,943	9,686	3,747	29,332
Milk separators	12,477	56,955	180,641	80,137	6,696	336,906

Agriculture (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1911, No. 4781, pp. 57–59*).—With respect to agriculture this report points out that the future outlook of the Russian peasant is to an extent encouraging, as the government and public institutions are now giving him effective help in several ways. "By being freed from the village community he gains the incentive of private ownership of his land; the Peasants' Agrarian Bank helps him to purchase land to be worked as independent small farmsteads; the cooperative and credit associations give him the credit necessary to purchase seed, cattle, and implements."

The Zemstvos are reported as aiding the peasants materially through their test farms where the peasants see the concrete results of better farming. Through lectures and demonstrations they also teach the peasants how to increase the yield of their farms and show them the advantage of longer rotations of crops, the use of better types of farm implements, and the proper cultural methods.

Annual report of the Agricultural Organization Society, Limited, for the year ended December 31, 1910 (*Ann. Rpt. Agr. Organ. Soc.* [*London*], *1910, pp. 158, figs. 26*).—This report shows the progress of the Central Cooperative Bank, founded in 1908 for the purpose of making advances at moderate rates of interest to cooperative societies in England and Wales. The advances made in 1910 nearly doubled those of 1909, and in many instances provided funds which were not obtainable from any other source.

The report shows that steady progress is being made in the direction of co operative insurance. The society, founded with funds of £20,000, now has available funds exceeding £27,000 to meet all claims, while bonuses at the rate of 25 per cent have been declared for the years 1909 and 1910.

The progress of the affiliated societies is also summarized.

Foreign crops, September, 1911, C. M. DAUGHERTY (*U. S. Dept. Agr., Bur. Statis. Circ. 24, pp. 15*).—This circular summarizes data as to the condition of farm crops in foreign countries in September, 1911, with estimates of yields as compared with previous years.

AGRICULTURAL EDUCATION.

Progress in agricultural education, 1910, D. J. CROSBY (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1910, pp. 315–386, pls. 9, figs. 3*).—This is a review for 1910 of the leading features of progress in agricultural education in this country and abroad, including the educational work of this Department, the Association of American Agricultural Colleges and Experiment Stations, the National Education Association, the fourth session of the Graduate School of Agriculture, the principal developments in agricultural education in foreign countries, and the leading items of interest concerning the colleges of agriculture in the United States, normal schools, and secondary and elementary schools in which agriculture is taught. The data concerning the elementary schools contain plans for a model rural school.

Statistics of land-grant colleges and agricultural experiment stations, 1910, MARIE T. SPETHMANN (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1910, pp. 271–314*).—A compilation from official sources of general statistics, courses of study, attendance, value of funds and equipment, revenues, and additions to equipment of the land-grant colleges, and of the lines of work, revenues, and additions to equipment of the agricultural experiment stations in the United States for the fiscal year ended June 30, 1910.

Correlating the work of agricultural instruction, A. C. TRUE (*South Ed. Assoc. Jour. of Proc., 21* (*1910*), *pp. 76–82*).—It is stated in this paper that "the settlement of the general limitations of the work of different grades of schools will do much to clarify and improve our educational situation. This is the task before our generation." The function as regards teaching agriculture is discussed for elementary schools, high schools, the agricultural high school, normal schools, and colleges and universities. The problem of so managing the school farm that it will be the right kind of laboratory and demonstration farm for a secondary school is deemed as yet an unsolved problem of very great importance, and an earnest effort to solve this problem is considered more to be commended than an attempt by the secondary school teacher to engage in ordinary extension work or in so-called experiments.

Preparing teachers to give instruction in agriculture, J. F. DUGGAR (*South Ed. Assoc. Jour. of Proc., 21* (*1910*), *pp. 142–146*).—The agencies at work in training teachers to give instruction in agriculture are enumerated, and it is stated that in fitting the teacher there must be imparted 3 distinct elements of success: (1) inspiration and a reasonable confidence in the importance of the end to be attained; (2) abundant subject-matter; and (3) some slight instruction regarding methods of teaching agriculture.

The author's recommendations as to the lines in which progress can best be made are as follows: "(1) More universal inclusion in the curriculum of normal schools of agricultural instruction, given by a specialist; (2) daily instruction and demonstrations in agriculture in teachers' institutes; (3) extension work in agriculture by universities and colleges for the special benefit of teachers; and (4) the gradual introduction, first by the more progressive and wealthier counties, of the system of employing supervisors of agricultural instruction."

The high school course in agriculture, K. L. Hatch (*Bul. Univ. Wis., 1911, No. 441, pp. 40*).—With the expectation that instruction in agriculture will find its way into the high schools of Wisconsin this bulletin has been prepared to suggest suitable plans for the carrying out of this work. It contains among other things (1) a suggested arrangement of work in agriculture and related sciences for each of the 4 years, (2) details of each unit of work, (3) a syllabus of a 4-year secondary course in agriculture as prepared by this Office, (4) necessary laboratory supplies for a class of 12 with estimated price, (5) text and reference books, including publishers' and list price, (6) a selected list of bulletins of this Department recommended for school use, and (7) a bibliography on agricultural education prepared by the U. S. Bureau of Education.

The farmers' institutes in the United States, 1910, J. Hamilton (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1910, pp. 387–424*).—This is the annual report of the Farmers' Institute Specialist of this Office for 1910 concerning the work of the Office in promoting farmers' institutes and the development of the farmers' institute movement in the different States and Territories. It includes, among other things, a discussion of agricultural college and experiment station aid to institutes, extension agencies, an account of the institutes for women and young people, county fair associations, the principal points of progress by States and Territories, an account of the annual meeting of the American Association of Farmers' Institute Workers, and statistical tables showing the number of institutes held, attendance, funds appropriated, cost, and number of lecturers employed.

Legislation relating to farmers' institutes in the United States, J. Hamilton (*U. S. Dept. Agr., Office Expt. Stas. Bul. 241, pp. 47*).—This is a revision of Bulletin 135 of this Office (E. S. R., 17, p. 715), bringing information concerning legislation on farmers' institutes up to April 1, 1911.

What Purdue is doing for Indiana agriculture (*Indiana Sta. Circ. 28, pp. 52, figs. 45*).—Information is here furnished concerning the work of the several departments of the agricultural experiment station and the school of agriculture, and of the department of agricultural extension.

The results of agricultural extension in Belgium, J. M. Stedman (*U. S. Dept. Agr., Office Expt. Stas. Rpt. 1910, pp. 425–447*).—This is a translation and summary of a monograph on agriculture in Belgium from 1885 to 1910, prepared by the minister of agriculture of that country for the twenty-fifth anniversary of the establishment of the Office of Extension Supervisors. The report contains a statistical statement concerning the rise in price of agricultural lands in Belgium and the increase in their productive power during the last 25 years, and an account of the organization and work of the extension supervisors and of the development of agriculture in each Province and the part taken therein by the extension supervisors from 1885 to 1910.

Live stock judging for beginners (*Indiana Sta. Circ. 29, pp. 128, figs. 99*).—This circular, prepared under the direction of J. H. Skinner, is designed primarily for beginners in the study of live stock judging.

It is divided into 6 parts and an appendix. Part 1, the introduction, considers the profitableness of the study of live stock judging, the score card, and comparative judging. Part 2, Judging Horses, by D. O. Thompson, includes draft, harness, and saddle horses, ponies, breeding classes, and the location of common unsoundness and faults. Part 3, Judging Beef Cattle, by F. G. King, treats of fat steers, feeder or stocker cattle, and breeding classes. Part 4, Judging Dairy Cattle, by P. H. Crane, considers the dairy cow and the dairy bull. Part 5, Judging Hogs, by W. W. Smith, treats of fat hogs, the brood sow, and the boar. Part 6, Judging Sheep, by H. E. Allen, is a study of fat and feeder sheep, breeding classes, and Merino or fine-wool type of sheep.

Score cards are given for draft horses, beef cattle, dairy cattle, lard hogs, and mutton sheep, as well as diagrams showing the points of the horse, beef animal, dairy cow, hog, and sheep, the wholesale cuts on the beef carcass and on the live steer, the wholesale pork cuts, and the mutton and lamb cuts. The appendix outlines a method of live stock improvement, by W. W. Smith, and contains a tabulation of breeds of live stock and breed associations, and lists of books and other publications about live stock.

Fruit for exhibition, A. J. NORMAN (*Facts for Farmers* [*Mass. Agr. Col.*], *1* (*1911*), *No. 12, pp. 4*).—Methods for preparing fruit for exhibition and suggestions for judging it are given, together with score cards for apples, plums, peaches, and grapes. The pamphlet is suitable for study in public schools.

Some health problems, E. L. HOLTON, F. H. SLACK, and L. D. BUSHNELL (*Agr. Ed.* [*Kans. Agr. Col.*], *Rural Life Ser.*, *3* (*1910*), *No. 1, pp. 15, figs. 13*).—This article was prepared for the village and rural teachers of Kansas, and deals especially with stamping out typhoid fever by attention to the typhoid or house fly, the water supply, and the milk supply.

Nature study by grades, H. H. CUMMINGS (*New York, Cincinnati, and Chicago* [*1910*], *pp. VI+274, figs. 87*).—This book is designed to meet the needs of pupils in the sixth, seventh, and eighth grades of elementary schools. The lessons are grouped into fall, winter, and spring work, and consist of suggestions to the teacher, questions, problems, and simple experiments in nature study.

Suggestions for girls' contests in sewing and cooking (*Agr. Ed.* [*Kansas Agr. Col.*], *2* (*1910*), *No. 7, pp. 30*).—This pamphlet was prepared with a view to bringing about more uniform work in institutes. The suggestions cover such matters as mending, sewing, score cards for bread, butter, and jellies, canning fruit and vegetables, and making butter under farm conditions.

MISCELLANEOUS.

Annual Report of the Office of Experiment Stations, 1910 (*U. S. Dept. Agr. Office Expt. Stas. Rpt. 1910, pp. 512, pls. 29, figs. 8*).—This includes the usual report on the work and expenditures of this Office for the fiscal year ended June 30, 1910, and of the work and expenditures of the agricultural experiment stations in the United States, including Alaska, Hawaii, Porto Rico, and Guam; statistics of the agricultural colleges and experiment stations for 1910, noted on page 896; and numerous articles and reviews abstracted elsewhere in this issue.

Annual Report of Alaska Stations, 1910 (*Alaska Stas. Rpt. 1910, pp. 85, pls. 13*).—This contains a report of the chief lines of work carried on during the fiscal year ended June 30, 1910. Meteorological data and accounts of the extensive tests with field and garden crops and of the live stock operations are abstracted elsewhere in this issue.

Seventeenth Annual Report of Montana Station, 1910 (*Montana Sta. Rpt. 1910, pp. 235–261, figs. 2*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1910, a report of the director on the work and publications of the station, and a meteorological summary of temperature, precipitation, wind direction, sunshine, and frost conditions at Bozeman, Mont., during the year.

Twenty-fourth Annual Report of Nebraska Station, 1910 (*Nebraska Sta. Rpt. 1910, pp. XXXIX+208, figs. 51*).—This contains the organization list, a review of the work of the year, including notes on field crops and hog-cholera serum abstracted respectively on pages 830 and 887 of this issue, a financial statement for the federal funds for the fiscal year ended June 30, 1910, and for the remaining funds for the fiscal year ended July 31, 1910, and special articles abstracted elsewhere in this issue.

Annual Report of Nevada Station, 1910 (*Nevada Sta. Bul. 73½, pp. 58*).—This contains the organization list and reports of the board of control, the director, and heads of departments. The report of the director includes the financial statement for the fiscal year ended June 30, 1910. The experimental work reported in the departmental reports is abstracted elsewhere in this issue.

Thirty-third Annual Report of North Carolina Station, 1910 (*North Carolina Sta. Rpt. 1910, pp. 206, figs. 102*).—This contains the organization list, reports of the director and heads of departments, the experimental work in which is for the most part abstracted elsewhere in this issue, a financial statement for the fiscal year ended June 30, 1910, numerous special articles abstracted elsewhere in this issue, an account of some breeding experiments in progress, and reprints of Press Bulletin 21, Treatment of Oats, Wheat, Rye, and Barley for Smut, and of Bulletins 205–208, previously noted.

Annual Report of Pennsylvania Station, 1910 (*Pennsylvania Sta. Rpt. 1910, pp. 632, pls. 70, charts 2*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1910, a report of the director on the work and publications of the station during the year, and departmental reports, the experimental work in which is abstracted elsewhere in this issue. The report also contains several special articles abstracted elsewhere in this issue, reprints of Bulletins 94, 96, 97, 99, and 100, previously noted, and a reprint, with some changes, of Bulletin 102.

Annual Reports of Virginia Station, 1909 and 1910 (*Virginia Sta. Rpts. 1909–10, pp. 232, pl. 1, figs. 188*).—This contains the organization list, a report of the director discussing the organization, finances, work, publications, and other data pertaining to the station, a financial statement for the fiscal years ended June 30, 1909, and June 30, 1910, departmental reports, of which that upon tobacco insect investigations is abstracted on page 854 of this issue, and numerous special articles abstracted elsewhere in this issue.

Free literature on farming, J. C. Marquis (*Wis. Library Bul., 7 (1911), No. 1, pp. 16–19*).—This article explains how free publications pertaining to agriculture may be collected and classified for use in libraries, with a view to making them more widely available.

NOTES.

California University and Station.—J. H. Norton, assistant chemist at the citrus substation at Riverside, has resigned to take effect February 1, 1912, when he will engage in commercial work.

Connecticut College.—An international egg-laying contest is being held at the college beginning November 1. Twelve States, Canada, and England are represented by 23 breeds. Fifty colony houses have been erected for the work.

Georgia Station.—L. J. Herring, assistant animal pathologist and veterinarian, has accepted an opening in commercial work.

Hawaiian Sugar Planters' Station.—Frank W. Terry, assistant entomologist, died November 7.

Louisiana University and Stations.—V. L. Roy, professor of agricultural extension work, has been appointed president of the State Normal School at Natchitoches. He is succeeded by E. S. Richardson, who will be assisted by W. H. Balis and Miss Agnes Morris.

A seed testing laboratory has been established at the Baton Rouge Station by the Bureau of Plant Industry of this Department. J. M. Moss is to be in charge of the laboratory.

E. S. Tucker, of the Bureau of Entomology of this Department, is to carry on investigations of insects affecting stored rice, and will make his headquarters at Baton Rouge after January 1, 1912.

Massachusetts Station.—J. F. Merrill has resigned as assistant chemist, this taking effect December 1.

Nebraska Station.—Miss Venus W. Pool resigned November 1 as assistant in agricultural botany to accept a position in the seed laboratory of the Bureau of Plant Industry of this Department.

Cornell University and Station.—Recent appointments include John Bentley, jr., of the Forest Service of this Department, as assistant professor of forestry, A. C. King, an 1899 graduate of the college of agriculture, as extension instructor, and Royal Gilkey, a 1908 graduate, as instructor in extension teaching.

Ohio Station.—D. W. Galehouse has been appointed assistant in charge of fair exhibits.

Oklahoma Station.—E. W. Stafford, whose resignation from the New Jersey Stations has been previously noted, has been appointed assistant entomologist.

Porto Rico Federal Station.—The position of entomologist has been filled by the appointment of Dr. Charles W. Hooker, of the Bureau of Entomology of this Department, who has entered upon his duties.

West Virginia University.—The inauguration of Dr. Thomas E. Hodges as president took place November 3. Among those in attendance during the exercises of the week were President Taft, who delivered an address on Judicial Settlement of International Disputes; Dr. F. B. Dresslar, of the United States Bureau of Education, who spoke on Duties and Opportunities of the Modern Scholar; President E. A. Alderman, of the University of Virginia, whose subject was The Universities and the National Spirit; President H. P. Judson, of the University of Chicago, who discussed The University and the State; and President W. O. Thompson, of Ohio State University, whose subject was The University and the People.

O

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